

EDGEWOOD CREEK WATERSHED ASSESSMENT

TECH MEMO I

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Prepared For:

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EDGEWOOD CREEK WATERSHED ASSESSMENT

TECH MEMO I

EXECUTIVE SUMMARY

Edgewood Creek drains an area of about 6.6 square miles at its mouth. The watershed lies predominantly within Douglas County, Nevada, with a small upper portion within California (see Figure 1). The land within the watershed has a variety of uses including the Stateline Casino area, Edgewood Golf Course, Heavenly Ski Resort, residential neighborhoods and state and federal land. The objective of the Edgewood Creek Watershed Assessment, funded by the State of Nevada, specifically the Nevada Tahoe Resource Team, is to fully evaluate the watershed in regards to stream morphology, fish and aquatic habitat, terrestrial wildlife and vegetation, and erosion hazards/sediment supply. The ultimate goal of the project is to propose and rank potential environmental improvement projects in order to maximize restoration of Edgewood Creek and its tributaries and to enhance the watershed for all the stakeholders.

The goal of Phase I of the Edgewood Creek Watershed Assessment is to collect, compile and analyze the existing information regarding the hydrology, geomorphology, water quality, terrestrial wildlife, aquatic habitat, and sediment supply/erosion potential of the watershed. Additionally, the goal is to identify the required data to be collected in Phase II.

Phase I Tech Memo includes the description of the data that has been collected in each discipline of the study. It also includes an analysis of those data, and a description of the additional data collection/field surveys that will be completed during Phase II. A brief synopsis of the findings is as follows.

Preliminary GIS Files and Database

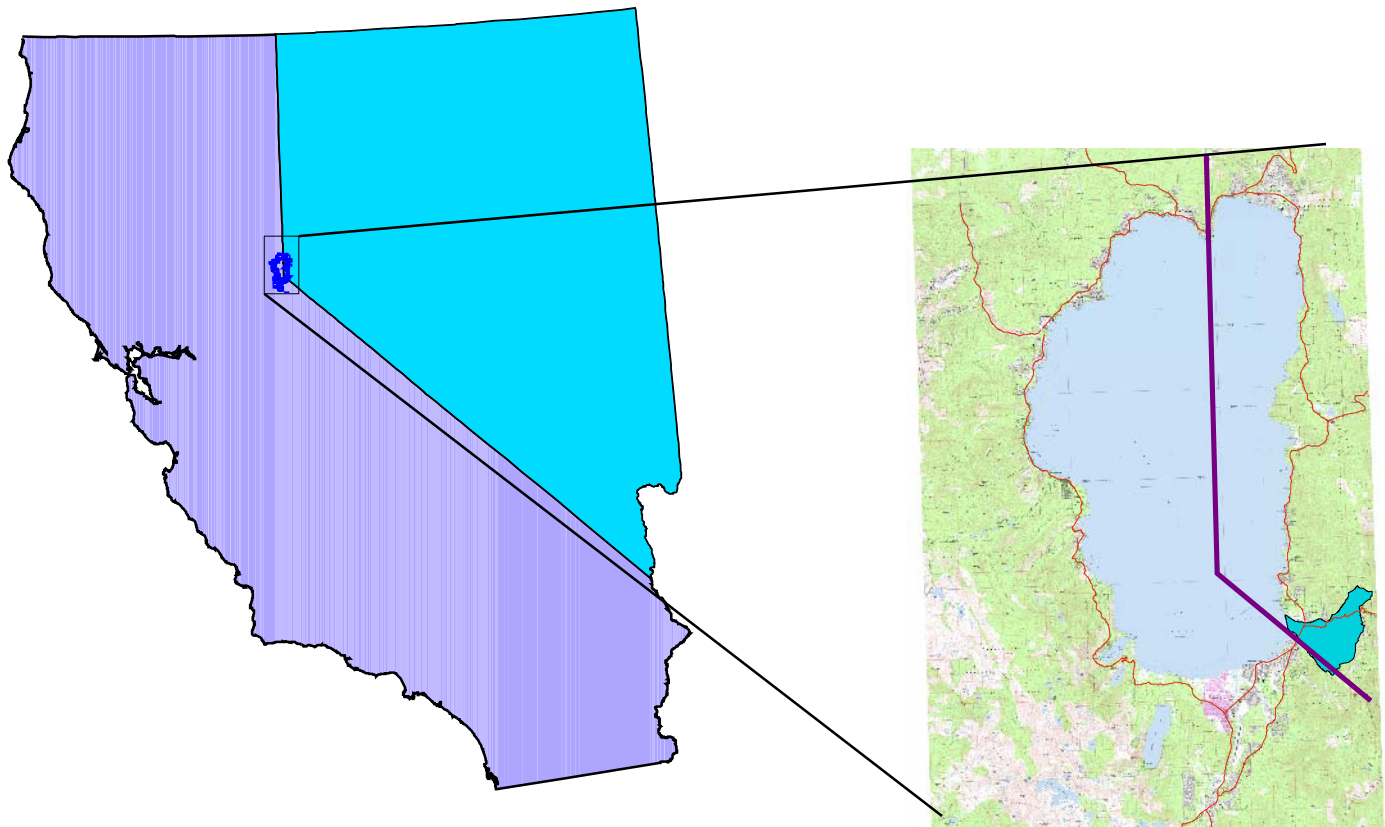
A comprehensive GIS database has been compiled from various sources including TRPA, USFS, the USGS, and Douglas County. The data have been analyzed and compiled, relating the various layers to each other to assist in the qualitative assessment of the watershed. Many of the data are represented in figures throughout this report.

Location of Stream Reaches for Immediate Reconnaissance

After brief field reconnaissance and a review of the available data, the main stem and tributaries of Edgewood Creek have been preliminarily divided into reaches. The delineations are based on previous research, channel morphology, and the location of anthropomorphic structures. Four of the reaches have been identified as high priority for more intensive field surveys because of habitat impairment, erosion hazards and/or the potential for restoration.

Evaluation of Data and Assessment of Additional Data Needs

Each discipline has included the review of the existing data and the evaluation of further data needed for complete assessment of the watershed. The requirements mainly include qualitative field surveys, limited sampling, and intensive data collection at specific stream reaches.



Legend

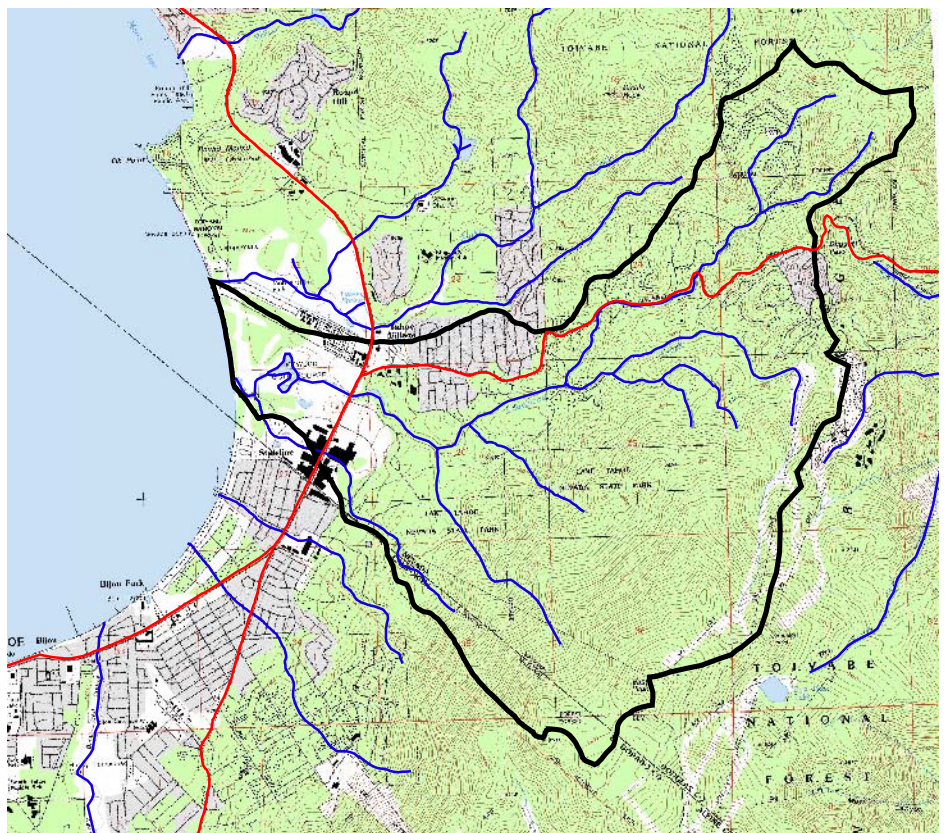
 Major Roadway

 Edgewood Watershed

 Streams



NTS



Watershed History and Preliminary Archeology Report

A general anthropomorphic account of Lake Tahoe and the Edgewood area is described to provide a history of the watershed disturbance and a foundation for the geomorphic processes and conditions in Edgewood. The historical periods that most significantly impacted the watershed are the 1880s-1890s Comstock mining period when the watershed was clear-cut and Kingsbury Grade was established as a major Sierra travel route; the 1950's when the gaming infrastructure in Stateline Nevada was established; and in 1956 when Heavenly Ski Resort was constructed.

Channel and Bank Stability Report

In the last 20 years, significant amounts of data have been collected and analyzed to characterize the sediment supply and channel morphology of Edgewood Creek and its tributaries. These data generally describe that runoff in the watershed, characterized by low magnitude peak event, along with the watershed's highly erodible soils and urbanization, have caused hillslope erosion and significant sediment delivery to the channels. The streams in the lower watershed have experienced aggradation and loss of stability. The focus of Phase II data collection will be to characterize the channel at a reach scale and identify the current level of disturbance and the disturbances' impact on the physical and biological function of each reach.

Water Quality

The water quality portion of the assessment is focused on the factors that negatively affect aquatic habitat quality and productivity within the stream. These include the overloading of the streams with fined-grain material, in-stream impairment of temperature and dissolved oxygen, loading of nutrients, and toxic contamination. There have been significant quantities of water quality data collected within the Edgewood Creek watershed in the last 20 years, attempting to characterize the impact from undisturbed and disturbed areas and the effects of mitigation measures on the water quality. These data indicate that Edgewood Creek is impaired in regard to both sediment and nutrients. In particular, it has an excessive load of iron and is on the Nevada List of Impaired Water Bodies (303d list) due to continually elevated levels of total iron¹. The general water quality impairment can be directly correlated to accelerated erosion of roads and urban areas. A reduction of the sediment supply, especially fine-grained sediment, may reduce the phosphorus loads. The Phase II data collection effort will include the mapping and evaluation of sediment sources in the watershed and along specific stream reaches and the documentation of stream conditions above and below major sediment source areas. It will also include the documentation of any water quality problems encountered during stream surveys and some physical measurements (temperature, pH, dissolved oxygen (DO), etc) within the stream.

Fisheries and Aquatic Habitat Report

The fisheries portion of the watershed assessment is focused on identification of disturbances to fish habitat and barriers to fish migration. The existing data outlines several areas of disturbances and barriers along Edgewood Creek and its tributaries. These include construction within channels, culverts and road crossings, the drainage of roads directly into the creek, and dams creating ponds. Phase II analysis will include a survey of the main stem of Edgewood Creek focused on identifying habitat impacts from land-use activities, potential spawning and

¹ The 2002 Draft 303(d) List was released July 1, 2002 for public comment; a copy may be obtained at: <http://ndep.state.nv.us/bwqp/303dlist.htm>. The Draft will be submitted to EPA for approval on October 1, 2002.

rearing habitat locations, and reaches for possible habitat restoration and enhancement projects. Phase II will also include the analysis of fish migration barriers and site-specific stream habitat surveys.

Riparian/Upland Vegetation and Habitat Report

In the analysis of the existing data on the vegetation within the watershed it was concluded that only general surveys have been completed. Although these are a good baseline for the assessment, more site-specific data will need to be collected in Phase II.

Terrestrial Wildlife

The existing wildlife surveys and delineations within the watershed have determined that there is habitat for and/or occurrences of willow flycatcher, marten, mesocarnivores, mule deer, waterfowl, northern Goshawk, and pacific tree frog. Phase II will include field surveys to verify habitat delineations and to assess the presence/absence of additional vertebrate terrestrial species. It will also include further analyses of existing data and identification of trends, forest characterization and management activities.

Land Use

Land use was delineated using the Douglas County designations. Although vacant land covers much of the watershed, there has been significant development within both the steep, upper portion and the lower, flat areas. The current land uses include golf course, ski area, commercial, single and multi-family residential, industrial and open space. Much of the land immediately adjacent to Edgewood Creek and its tributaries has been developed. In the upper region of the watershed, residential communities and roads accessing those communities are particularly intermingled with the creek.

Stakeholders List

A list of stakeholders and a series of goals for public participation process have been identified. The stakeholders include all major property owners in the area as well as those owning property adjacent to the creek or its tributaries, local business owners, recreation groups that might use the watershed, government entities within the area, municipal and psuedo-municipal agencies, improvement districts and neighborhood associations within the area. The goals of the public participation process include establishing good communications with all of the stakeholders and obtaining their investment in the project. In this way, stakeholders can become part of the project, helping to steer its direction and conclusions.

Preliminary Proposed EIP Selection Matrix

A process to evaluate potential EIP's resulting from this assessment has been preliminarily established. An EIP evaluation matrix is included in this document. During the initial public participation process stakeholders will be introduced to the rating scheme and asked to comment on it. This process will continue to take shape with public participation and stakeholder input.

1.0 PRELIMINARY GIS FILES AND DATABASE

TRPA, USFS, Douglas County, and the USGS have generated extensive GIS data for the Lake Tahoe region including the Edgewood Creek watershed area. These data were compiled into a comprehensive database within ArcView, using UTM NAD27 datum. The figures throughout the document display many coverages of the data including land use, geology, soil, erosion hazard, slope, and USGS, etc. sampling sites. A full list of the data available is not practical to generate, as there are hundreds of coverages. A partial list of the key coverages are outlined in Table 1.1, with their source and date, as available.

As fieldwork is completed in Phase II, additional data will added to the database. The most significant additions will be reach data, characterization of roads (dirt or paved), culverts, erosion control structures and sediment bases.

Table 1.1: GIS Coverages

Coverage	Source	Date
Parcel Delineation	Douglas County	NA
Watershed Delineation	Douglas County	1992
Stream Delineation	Douglas County	1992
40-ft Contours	USGS	1992
10-M DEM	USGS	1992
Digital Ortho Photo	USGS	1992, 1998
Landsat 7 Image	USGS	1999
Land Cover	USGS	NA
Population	USGS	1980
Fire Data	LTBMU	1995-2001
Infrastructure: roads, buildings, etc.	LTBMU	1994-1999
Planning: management areas, conservations areas, etc	LTBMU, TRPA, etc.	
Geology	TRPA	1990
Soil	NRCS	1999 (update)
Vegetation Delineation: old-growth, wet meadows, plant types, etc	LTBMU, etc.	1994-2001
Water bodies: lakes, streams, etc.	USGS, LTMBU	1992
Wildlife habitat delineation	LTBMU	1983

2.0 LOCATION OF STREAM REACHES FOR IMMEDIATE RECONNAISSANCE

A reach is a general term used to describe a section of stream where a variable of interest is considered to be constant. The homogeneous reach concept allows other variables to be assessed while holding the controlling variable constant. Therefore, reach delineations and reach boundaries can vary considerably depending upon the goals of the study. For example, a study assessing the impact of fine-grained sediment on channel morphology might designate reaches differently than a study looking at the distribution of a particular riparian species.

Since the Edgewood Creek Watershed Assessment has multiple goals, in terms of understanding the functions, processes, and levels of impacts in the riparian corridor, we have designed a reach designation that takes into consideration a variety of factors. We also want to maintain some consistency with previous studies conducted in the watershed so that the results generated from our surveys could be referenced and compared to the previous work.

Our approach for reach designation included the following steps:

- Use of Existing USGS reach designations: Since a component of our Phase II assessment will be to replicate some of the work conducted by the USGS in the mid-1980's, we decided to maintain the same reach breaks (Hill et. al., 1990). The USGS study only encompassed the upper half of the watershed. Reach delineations by USGS appear to be based on confluence locations, road crossings, and channel gradient. The actual criteria are not specified in the report. The same numbering system for reaches was carried over to our reach delineation to maintain consistency.
- Additional Reaches: Stream segments not delineated by USGS were delineated based on an initial field reconnaissance and locations of tributary inputs, known changes in channel and valley morphology, and the presence of impoundments. An additional reach was also delineated in the upper portion of the mainstem of Edgewood Creek upstream of Heavenly Valley's Boulder Lodge parking lot (Hazelhurst and Widegren, 1997). The USGS study did not include this area as a reach.

These reach delineations should be considered preliminary. Adjustments will be made to each of the boundaries, if necessary, during our Phase II initial field survey. A total of 10 reaches have been delineated. Figure 2.1 and Table 2.1 show and describe the location of each reach along with some general statistics. More detailed information will be generated during Phase II as the locations of the reach breaks are defined further. An assessment of cumulative impacts through detailed reach analysis will have the highest value on the primary trunk streams, given time and budgetary constraints. Therefore, preliminary reach breaks were limited to the mainstem of Edgewood Creek and the North Fork. The condition of the tributaries will be addressed by assessing their impacts (i.e. – sediment or other) on the primary trunk streams. Additional reach delineations on tributary streams will be identified during an initial stream corridor survey and a decision will be made at that time whether or not to add them to the detailed reach survey.

Based on an initial reconnaissance survey of the watershed, several reaches were identified as a high priority for evaluation by the Edgewood Creek Integrated Watershed Assessment Team. These reaches include:

- Reach 9: Several impoundments and off-channel ponds make this reach important to assess in terms of channel aggradation and potential barriers to fish migration.
- Reach 7: This reach, located primarily on Park Cattle Company land, includes a large meadow at the upstream end that may have significant biological value.

- Reach 6: This reach encompasses a large parcel that is currently owned by the U.S. Forest Service. TRPA staff identified this parcel as having a high potential for meadow and stream channel restoration. Additionally, extensive erosion and headcutting appears to be occurring on a small tributary to this reach.
- Reach 4: Kingsbury Grade runs adjacent to a large portion of this reach on the “North Fork” of Edgewood. Impacts from road runoff and sedimentation need to be closely assessed through this reach.

2.1 LIST OF REFERENCES

Hazelhurst, S. and Widegren, B. 1997. Heavenly Ski Resort 1997 environmental monitoring report. USDA Forest Service, Lake Tahoe Basin Management Unit.

Hill, B., Hill, J., and Nolan, M. 1990. Sediment-source data for four basins tributary to Lake Tahoe, California and Nevada, August 1983 – June 1988. U.S. Geological Survey Open-File Report 89-618. Prepared in cooperation with the Tahoe Regional Planning Agency. Sacramento, California.

3.0 EVALUATION OF DATA AND ASSESSMENT OF ADDITIONAL DATA NEEDS

Each chapter within the report outlines the evaluation of the available data and the assessment of Phase II data requirements. In general, extensive data and past analyses are available for Edgewood Creek. Some of the existing data and reports, because of unavailability of personnel and extended time frames required for data acquisition, have not been reviewed. These include the Edgewood Golf Course water quality data and additional data from the golf course that is as of yet not available; hydrologic models for Edgewood Creek; erosion control plans generated by Kingsbury Improvement District for three residential communities within the watershed; and some UGSG, USFS and TRPA data collection location sites protocols. These will be obtained and reviewed as soon as possible.

Much of the collection associated with Phase II will be done with qualitative surveys of the streams and the upland areas. The most intensive data collection will be required for a full characterization of channel stability/geomorphology and fishery/aquatic habitat. The data collection for these two disciplines and the water quality assessment will be coordinated and completed at the same time. Initially, a detailed watershed delineation, road slope/characterization and culvert/erosion control structure location map will be generated with field surveys. This will be done to quantify and characterize the runoff draining to each stream reach. Once this is done, a main stem survey of each stream reach will be carried out. Areas of significant disturbances will be identified and a detailed channel survey will be completed up and downstream of the areas. The work will be focused on the four reaches previously identified as impaired. The intensive data collection for water quality, stream morphology and fishery habitat will be done concurrently.

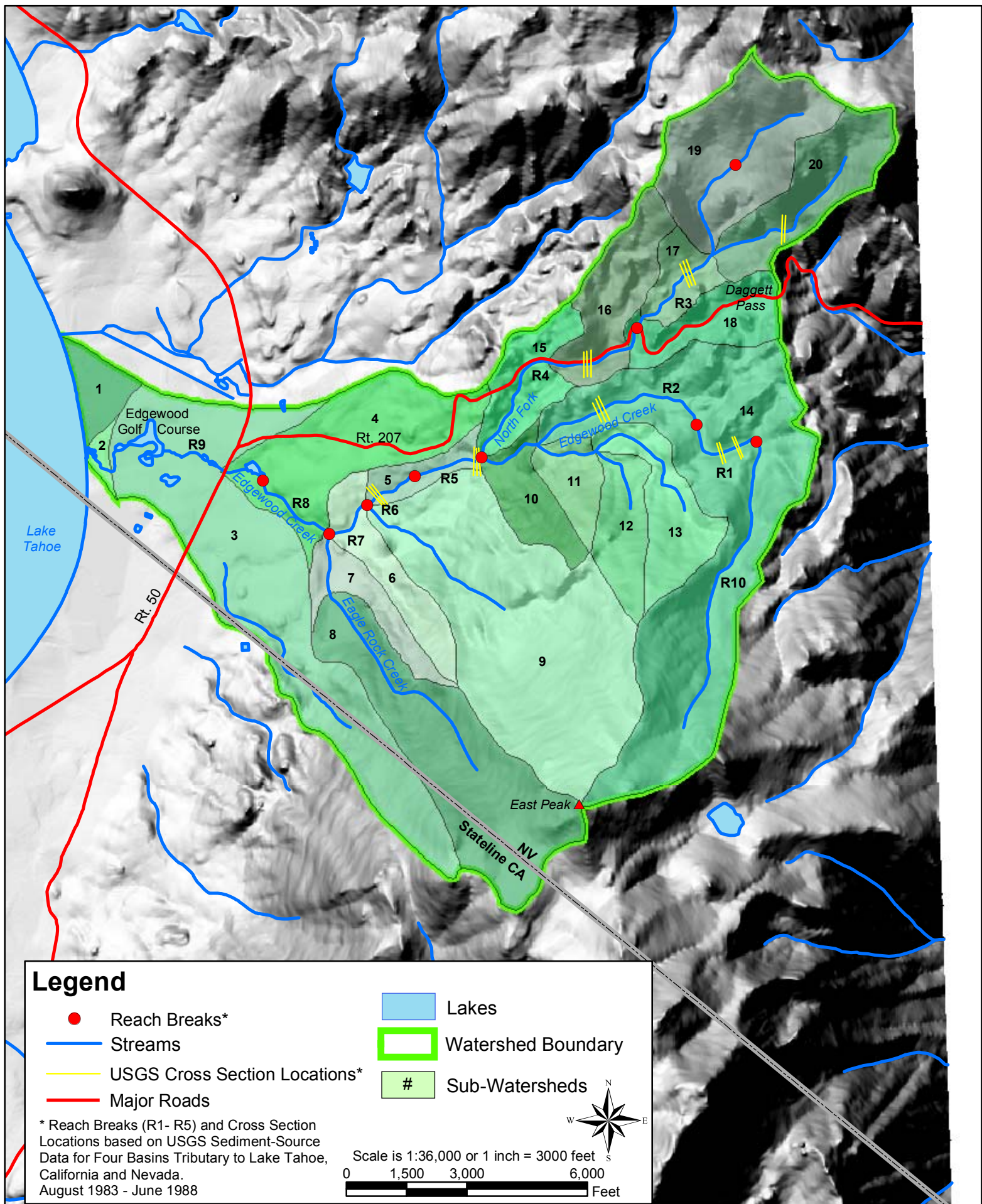


Table 2.1: Summary of Stream Reaches in the Edgewood Creek Watershed, Lake Tahoe Basin along the Nevada/California Stalene

Reach ID	Description	Drainage Area at Downstream End (acres)	Length (ft)	Minimum Elevation Along Streamline (ft)	Maximum Elevation Along Streamline (ft)	Fall Along Stream Reach (ft)	Gradient for Entire Reach
R1	Upper Mainstem, downstream of Reach 10 and upstream of Reach 2	543	2133	7110	7226	116	0.054
R2	Upper Mainstem from the junction with the North Fork at the downstream end to Reach 1 at the upstream end	1111	6314	6666	7110	444	0.070
R3	North Fork above the Hwy 207 crossing, including the more northern of two forks in the headwaters	509	5532	6997	7394	397	0.072
R4	North Fork from the junction with the mainstem at the downstream end to the Hwy 207 crossing at the upstream end	888	5886	6666	6997	331	0.056
R5	Middle Mainstem from the junction with the North Fork at the upstream end to the former USGS gage site and Reach 6 at the downstream end	2051	1791	6513	6666	153	0.085
R6	Middle Mainstem from the former USGS gage site at the upstream end to the next tributary junction downstream (between Reaches 5 and 7)	2051	1458	6403	6513	110	0.075
R7	Middle Mainstem between two tributaries flowing northwest from the southern part of the basin (between Reaches 6 and 8)	2824	1330	6390	6403	13	0.010
R8	Lower Mainstem from the upstream side of the upper in-channel reservoir to the first junction of the northwesterly flowing southern tributaries	3521	2299	6315	6390	75	0.033
R9	Lower Mainstem through the golf course, including in-channel ponds to the upstream side of the uppermost in-channel reservoir above Hwy 50 (from the Tahoe lakeshore to Reach 8)	4205	5841	6228	6315	87	0.015
R10	Upper Mainstem headwaters above Reach 1, flowing north-northeast	387	7693	7226	8723	1497	0.195

4.0 WATERSHED HISTORY AND PRELIMINARY ARCHEOLOGY REPORT

The archeology analysis component of the Edgewood Creek Watershed Assessment consists of two components:

- General description of land use history that can be translated into watershed disturbance history and the foundation of current geomorphic processes and conditions in the watershed; and
- Archeological concerns regarding site specific impacts of Environmental Improvement Projects (EIPs) and planning requirements for implementing individual watershed improvement projects.

The following is a synopsis of relevant land use history drawing from a number of documents, most notably the Lake Tahoe Watershed Assessment (USFS, 2000) and local experience of Susan Lindstrom, PhD. An analysis of potential impacts and planning consideration for EIP watershed projects will be completed as the final prioritized project list is being assembled in Phase 3.

The Edgewood Creek study area lies entirely within the nuclear territory of the Washoe Indians. Archaeological remains suggest aboriginal occupation of this region by about 9000 years ago. A known Washoe camp near Edgewood Creek (lamwO'tha) was noted for fishing and plant gathering.

The first recorded sighting of Lake Tahoe by a Euroamerican was by John C. Fremont in 1844. Aside from a few trappers and probably some adventuresome miners moving east from the foothills, the Tahoe Basin was not settled by Euroamerican “newcomers” until the late 1850s. The opening of the Comstock mining boom in Nevada in 1859 prompted a sudden surge of wagon and freight traffic through the Tahoe Basin. Nearby Kingsbury Grade served as a primary route for early trans-Sierran travel. The first Pony Express rider crossed the Sierra over Daggett Pass by way Kingsbury Grade in 1860.

One of the earliest roads between the Mother Lode mines around Placerville and the Virginia City mines of the Comstock Lode crossed Edgewood Creek. Laid out in 1852 as the “Johnson Cutoff”, it was first known as the “Lake Tahoe Wagon Road”; in 1914 the road was designated as the “Lincoln Highway”; and finally the route was established as Highway 50. Along these early roads, hostleries, way stations, and inns (such as Friday’s Station and Lakeside, located near present-day Stateline) sprang up in order to provide the services required by travelers. Small-scale ranching and farming endeavors developed in support of the local economy.

The meadows between Edgewood and Zephyr Cove were grazed heavily. Meadows in the vicinity of Burke and Edgewood creeks were purchased by the Park family (Park Cattle Company) and grazed until recent decades.

Fishing provided another small but important industry in the Tahoe Basin, but it flourished initially in 1858 and then declined rapidly. The industry produced food for the local communities and settlements outside the basin until 1917.

The pressing need for fuel for the Comstock mines created the demand for lumber and timber harvesting was directed to the Lake Tahoe Basin during the 1860s. Large numbers of Chinese immigrants worked in the basin's logging industry during the 19th century. Two of the largest lumber companies that operated in the Tahoe Basin, the Carson Tahoe Lumber and Fluming Company and the Sierra Nevada Wood and Lumber Company, had timber holdings in the southeastern basin in the project vicinity. Here, historic events centered at the Hobart logging camp, alleged to be located somewhere along the lower reaches of Burke Creek.

By the late 1890s, the demand for lumber dropped sharply, as the Comstock mining boom drew to a close and forests of the Tahoe Sierra were depleted. The basic land-use pattern during this post-Comstock period became a mixture of commercial resort businesses, the growth of large private holdings or estates, and small-scale agricultural production and seasonal grazing in support of the resorts and estates. As the Tahoe Basin attracted more tourists, diverse resorts appeared along the southeast shore of the lake. People of more modest means vacationed in rustic hotels and cottages or camped at facilities such as Lakeside and the 4-H Camp near Stateline.

The movement toward year-round use of the Tahoe Basin brought building and development to Tahoe's shores, with the need to house employees, not only vacationers. The legalization of gaming in Nevada in 1931 and the opening of gaming establishments at Lake Tahoe during the 1940s and 1950s prompted an increase in the volume of tourists and permanent residents to Tahoe's southeast shore. To retain more of the tourist's dollars on the Nevada side, the gaming houses erected high-rise hotels and elegant restaurants fronting the bay around Stateline. Heavenly Ski Resort opened in 1956, with further expansion of Tahoe's ski industry occurring after the 1960 Winter Olympics at Squaw Valley.

5.0 PRELIMINARY CHANNEL AND BANK STABILITY REPORT

5.1 OVERVIEW

An effective watershed assessment consists of a comprehensive analysis of the both the physical and biological conditions found in the watershed and the level of impact affecting each. A strong understanding of the physical condition of the watershed of interest is important because factors such as soil, geology, channel form, and hydrologic regime ultimately determine the range of biological functions that can be supported and controls the spatial distribution and quality of discrete ecosystems or ecotypes found within the watershed.

The physical components of a watershed can clearly be categorized into upland versus stream corridor conditions and processes. Upland areas consist of the hillslopes, ridges, and zero order swales, whereas the stream corridors consist of the stream channels and valley floor. Though the categorization of these two distinct landscape types is easy from a morphological perspective, the processes occurring in the upland areas heavily influence the stream corridors, making their separation, from a management perspective, more difficult. Since stream corridors collect runoff

and sediment from the upland areas, disturbances occurring on the uplands have a cumulative impact on the stream channel. The concept of a cumulative impact makes stream corridors an ideal location to assess non-point disturbance sources such as erosion from road surfaces or other disturbed lands. The dendritic nature of stream channel networks make them ideal for pinpointing distributed erosion sources by analyzing data at the subwatershed level.

The primary source of impact on stream channel and stream corridors in urbanizing watershed relates to modifications to the hydrologic regime and/or adjustments to the historic sediment supply and grain sizes being delivered to Edgewood Creek (Thom et. al., 2001; Booth and Henshaw, 2001). Hydrologic conditions are often modified by increases in impervious surfaces in a watershed, resulting in higher runoff volumes that peak much faster than under natural conditions. Higher peak runoff events often results in channel adjustments such as incision or bank erosion that increase sediment supply. Additionally, disturbed lands can further increase the sediment supply that reach stream channels by way of road side ditches or newly formed gullies. In the upper watershed, where steeper channels occur, sediment can be easily moved through the system. The problems arise in the lower gradient channels, more common at the lower end of the watershed, where the sediment is deposited, resulting in bank erosion and increased overbank flows. The lower, flatter reaches of the watershed is often where human development occurs. When hydrologic and sediment supply conditions change as a result of urbanization, extensive flooding of homes, and businesses, and loss of critical infrastructure such as roads and bridges, can result. Culverts or uncontrolled stream crossings can also have a significant impact on channel stability and sediment supply by focusing flow and providing a pathway for direct input of sediment into the channel.

In order to achieve long-term physical improvements and ecological stability to stream channels in urbanizing watersheds, efforts should be focused on sediment supply and storm water management (Jackson et. al., 2001). Upland management strategies require a good understanding of the flow paths from roads and other impervious surfaces that directly deliver storm water and sediment to the channel. By identifying the contributing areas that have the most impact on stream channels, in terms of storm water and sediment delivery, a system of treatments could be developed to reduce impacts through a clearly defined and well-documented cost-benefit analysis. Information about the level of impairment to stream channels along with an understanding of the spatial distribution of sediment sources, should be the primary elements of an effective watershed restoration program. Such a program, combined with a focused stream channel enhancement program, with clearly identified objectives (e.g. – restoring SEZ's), is the best approach to restoring the physical and biological processes in the watershed.

The remainder of this chapter will discuss the hydrologic and geomorphic conditions found in the Edgewood Creek Watershed, based on existing data and a reconnaissance level survey of the watershed. Additionally, future data needs and proposed data collection methods, the results of which will be presented in Phase II of the Watershed Assessment for Edgewood Creek, will be discussed. Information found in this section of the overall Phase I Technical Memo may overlap with discussions found in the Water Quality section, since the focus of the impacts in the Edgewood Creek Watershed relates to sediment erosion and delivery to stream channels, an issue that affects both water quality and the geomorphic integrity of the basin.

5.2 SETTING

The Edgewood Creek watershed, located in the southeast corner of the Lake Tahoe Basin just east of the California and Nevada state line, abuts one of the most urbanized areas of the Lake Tahoe Basin (Figure 1). A majority of the approximately 6.6 square mile watershed occurs in Douglas County, Nevada though a sliver of upper watershed on the western edge of the basin occurs in El Dorado County, California. Much of the northern half of the watershed consists of a suburban landscape with subdivisions, a dense road network, and a high percentage of impervious surfaces. The southern portion of the watershed consists of larger parcels owned primarily by the U.S. Forest Service and the Heavenly Valley Ski Area.

The main stem of Edgewood Creek consists of 5.5 miles of stream channel (Rowe et. al., 2002). An additional 8.5 miles of perennial and 37 miles of intermittent and ephemeral drainages occur within the Edgewood Creek watershed (LTBMU, GIS Database). Several impoundments, ponds, and diversions occur in the lower part of the watershed. The impoundments and ponds are located up and downstream of Highway 50 and on the Edgewood Creek Golf Course. The most significant diversion occurs on Eagle Rock Creek. Since the larger impoundments and ponds are kept full during most of the year, they do not provide any significant flood control, though summer baseflow may be reduced through evapotranspiration and percolation.

Snowmelt is the dominant hydrologic process in the watershed, though intense rain-on-snow events can saturate the soils and produce moderate peak flow events. The runoff processes in the watershed are dampened by the fact that a majority (over 90%) of the geology and soils present in the watershed consist of highly porous decomposed granite (Figures 5.1 and 5.2). These types of highly porous soils also result in persistent and consistent baseflow conditions. Streamflow in the summer months of July, August and September typically range between 0.2 and 1.0 cfs (Rowe et. al., 2002). Though summer baseflows can get extremely low, there is no evidence that the stream channel dries out completely, even during drought years.

The basin is dominated by decomposed granite soils that are porous enough to limit high magnitude peak flow events, but are also highly erodible. Based on the data available in the USDA SCS Soil Survey, much of the soils present in the Edgewood Creek watershed are classified as having "Severe" limitations for road building, excavation, or dwellings (Table 5.1). Over 70% of the watershed is also categorized as having a "High" erosion hazard rating (Figure 5.3).

The combination of low magnitude peak flow events, highly erodible soils, and an urbanizing watershed has resulted in increased hillslope erosion and sediment delivery to stream channels. Many of the streams in the Edgewood Creek watershed, especially those in the lower or flatter portions of the watershed are experiencing excessive sedimentation and loss of channel stability and ecological complexity. Sedimentation often results in loss of important habitat for fish populations through filling of pools and reduction in available hiding spots (i.e. cover). Sedimentation can also reduce available spawning habitat and bury aquatic insect habitat, a primary food source for many aquatic organisms.

5.3 EXISTING DATA SUMMARY

An extensive amount of hydrologic data currently exists for the Edgewood Creek watershed. Much of this information has been summarized in the following U.S. Geological Survey reports and fact sheets:

- U.S. Geological Survey, Open File Report 89-618. Sediment Source Data for Four Basins Tributary to Lake Tahoe, California and Nevada, August 1993 – June 1988, by Barry Hill, J.R. Hill, and Michael Nolan.
- U.S. Geological Survey, Water Resources Investigations Report 02-4030. Streamflow and Water Quality Data for Selected Watersheds in the Lake Tahoe Basin, California and Nevada, through September 1998, by Timothy Rowe, Dina Saleh, Sharon Watkins, and Charles Kratzer.
- U.S. Geological Survey Fact Sheet FS-035-02. Estimated Flood Flows in the Lake Tahoe Basin, California and Nevada.

Though a significant amount of hydrologic data exists for Edgewood, much of this data was collected during a brief data collection period since the mid-1980's. Almost no streamflow or sediment loading data exists prior to the mid-1980's making it difficult to assess long-term trends in hydrologic conditions or accurately predict the magnitude or frequency of peak flow events.

Table 5.2 and Figure 5.4 summarize and depict existing or historic streamflow and water quality sampling sites. The two sampling sites on Edgewood Creek with the longest streamflow record that encompass a large part of the watershed are Site 243 (USGS Gage #103367585 – Edgewood Creek at Palisades near Kingsbury, NV) and 246 (USGS Gage #10336760 – Edgewood Creek at Stateline, NV) (Figure 6). The drainage area of Site 243 is 3.13 square miles, slightly less than half of the entire watershed area. The drainage area of Site 246 is 5.61 square miles. Unfortunately, flow at Site 246 is affected by regulation from several impoundments and diversions on Eagle Rock Creek, limiting the usefulness of this site for assessing hydrologic conditions in the watershed (USGS, FS-035-02), leaving Site 243 as the only remaining gage with a long enough record to compute flood frequencies. The gage at Site 243 provides a 10-year record of peak and mean daily flow values. Though this is a limited number of years, the magnitude of flow at different return intervals can still be assessed. Table 5.3 summarizes estimated peak discharges for different recurrence intervals along with monthly exceedence probability values. The 100-year peak discharge for 3.13 square miles of the basin was estimated to be 153 cfs. Assuming the peak discharge increases linearly with drainage area in the Edgewood watershed, the 100-year peak discharge for the entire basin would be approximately 300 cfs. These results underscore the high infiltration rates that occur in the Edgewood Creek watershed, despite extensive runoff from impervious surfaces. This contrasts greatly with comparably-sized watersheds on the west side of the Tahoe Basin, such as Ward and Blackwood Creeks, where 100-year peak discharges are estimated to be 2,700 cfs. The largest recorded flood peak at the Site 246 gage on Edgewood was 136 cfs on January 2, 1997. At Blackwood and Ward Creek, the highest recorded flood was 2,940 cfs and 2,530, respectively, which occurred on January 1, 1997.

Though a wealth of hydrologic data exists for Edgewood Creek, very little comprehensive geomorphic is available, such as observations of channel and bank conditions, monumented and repeatable cross-section data, or location and extent of headcuts or gullies. The most comprehensive set of data was collected by the U.S. Geological Survey as part of a study on four basins tributary to Lake Tahoe (Open-File Report 89-618, described above). The data collected is not completely comprehensive since it only includes survey information collected upstream of USGS Gage #10336759, which has a drainage area of 3.3 square miles. The remainder of the watershed downstream of this site was not included in the study.

Data for the USGS study was collected from August 1983 to June 1998 and included the following pieces of information:

- Channel cross-section surveys by reach (reaches shown in Figure 2.1)
- Aerial mapping of erosional landforms
- Bank erosion inventory
- Sediment storage volumes in the channel
- Placement of erosion pins
- Bed and bank grain-size analysis
- Estimated hillslope erosion rates using erosion boxes
- Active gully mapping
- Streamflow and suspended sediment sampling

Unfortunately, the data collected for this study was only synthesized and not analyzed in detail. A cursory review of the information yielded the following observations:

- Cross-section change: No patterns appear to exist in terms of bank retreat. The magnitude of change in the position of the left and right banks is fairly insignificant, except in a few isolated cases. The bed appears to be incising consistently in some of the mainstem reaches though the magnitude of the change is fairly small.
- Reach-scale measurements: Organic debris appears to be a significant factor in storing sediment in the channel in the upper watershed, but less so in the lower watershed. Significant portions of the banks in the watershed are eroding.
- Substrate conditions: In four out of the seven reaches surveyed, over 90 percent of the bed material consisted of material less than 2 millimeters. The remaining three reaches ranged

from 38 to 70 percent less than 2 millimeters. The percent of material finer than 2 millimeters in the banks was greater than 90% in six out of the 7 reaches.

- Hillslope erosion: Data from the erosion boxes indicate that 50 to 80 percent of the sediment being transported on the hillslope is finer than 2 millimeters. The percent delivery from the hillslopes is, therefore, delivering more coarse sediment than what is present in the channels based on surficial sampling. This suggests that the stream channels are unable to move the supplied sediment and is therefore being overwhelmed. These results may also suggest burial of coarser sediment in the stream channel.

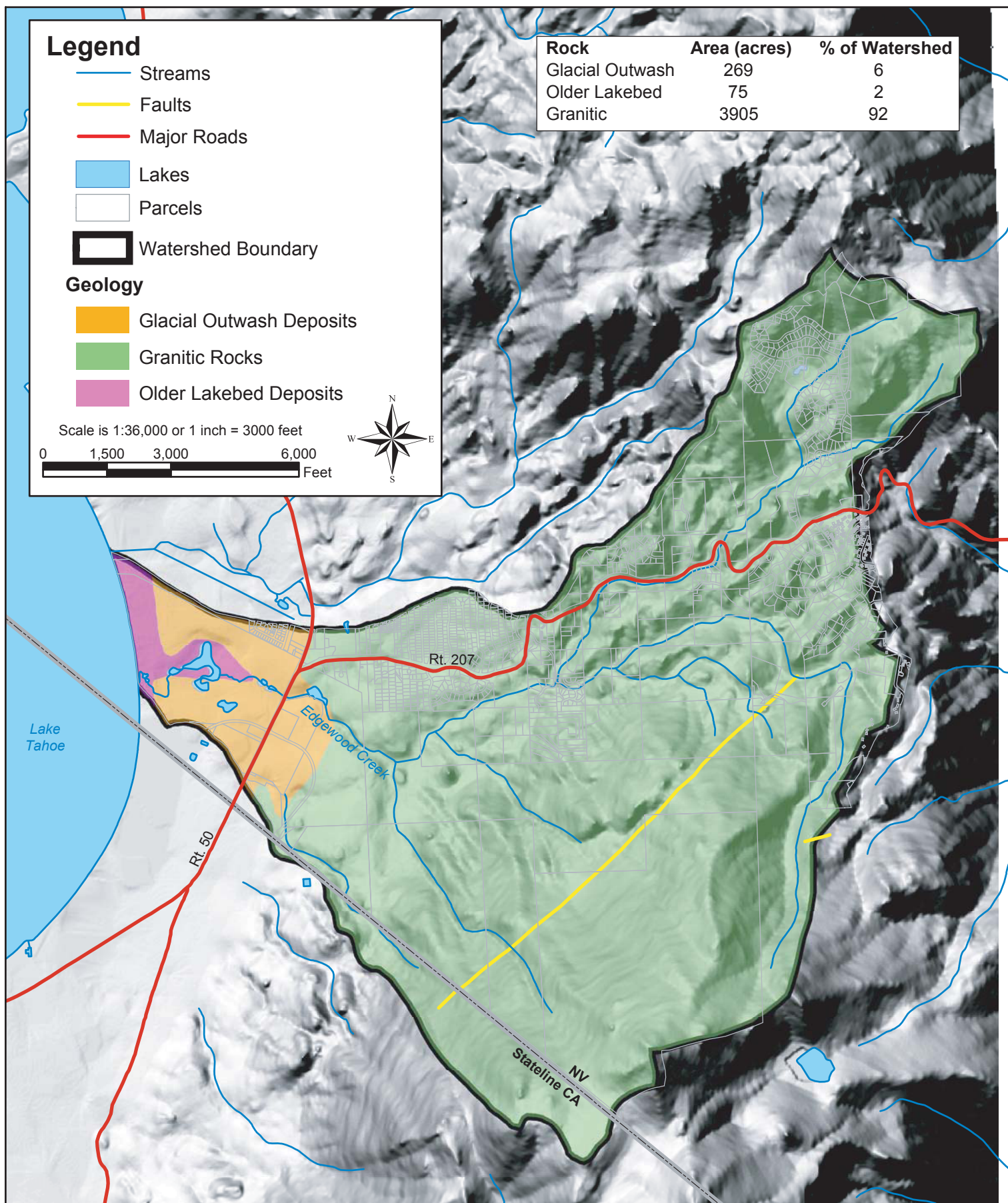
Though some useful conclusions can be gathered from the USGS dataset, the usefulness of the information lies in the fact that it provides a baseline of data describing conditions found in the Edgewood Creek watershed in the mid-1980's.

A few additional datasets are also available for portions of Edgewood Creek. These datasets include:

- Heavenly Ski Resort – 1997 Environmental Monitoring Report: Pfankuch stream stability surveys were conducted on upper Edgewood Creek above the Boulder Lodge parking lot in 1991 and 1997 along approximately 1,600 feet of channel. The summary suggests that bank stability improved from 1991 to 1997 due to increased vegetative growth along the banks. This was mainly attributed to a large storm event that occurred in 1991 prior to the bank survey which scoured the channel and “blew out” large portions of the banks. The report also noted less sand deposition through the study reaches in the 1997 survey, as compared to the 1991 work.
- Edgewood Creek EIP Assessment: TRPA walked a large portion of Edgewood Creek in June and July of 2001 to assess potential EIP projects. This was primarily a qualitative survey though it may assist our surveys during the initial walk-through.
- TRPA cross-sections: Larry Benoit, of the TRPA, surveyed cross-sections at multiple sites on Edgewood Creek to assess potential SEZ restoration opportunities. That data is currently being processed by TRPA staff and should be available to our team prior to Phase II data collection.

5.4 DATA NEEDS AND PROPOSED PHASE II DATA COLLECTION

The focus of our Phase II field assessment will be to collect detailed channel condition information, at the reach scale. The collected information will allow for an assessment of existing channel condition, the current level of disturbance, and degree of impact to the physical and biological function of each reach. We propose to do this by establishing detailed study reaches up and downstream of locations identified to be significant disturbances (e.g. – road crossings) or locations where there is input to the stream system from significant upland disturbance areas. The upland survey team will provide us with a map depicting the locations and extents of storm water input to the stream corridors from roads and other developed areas.



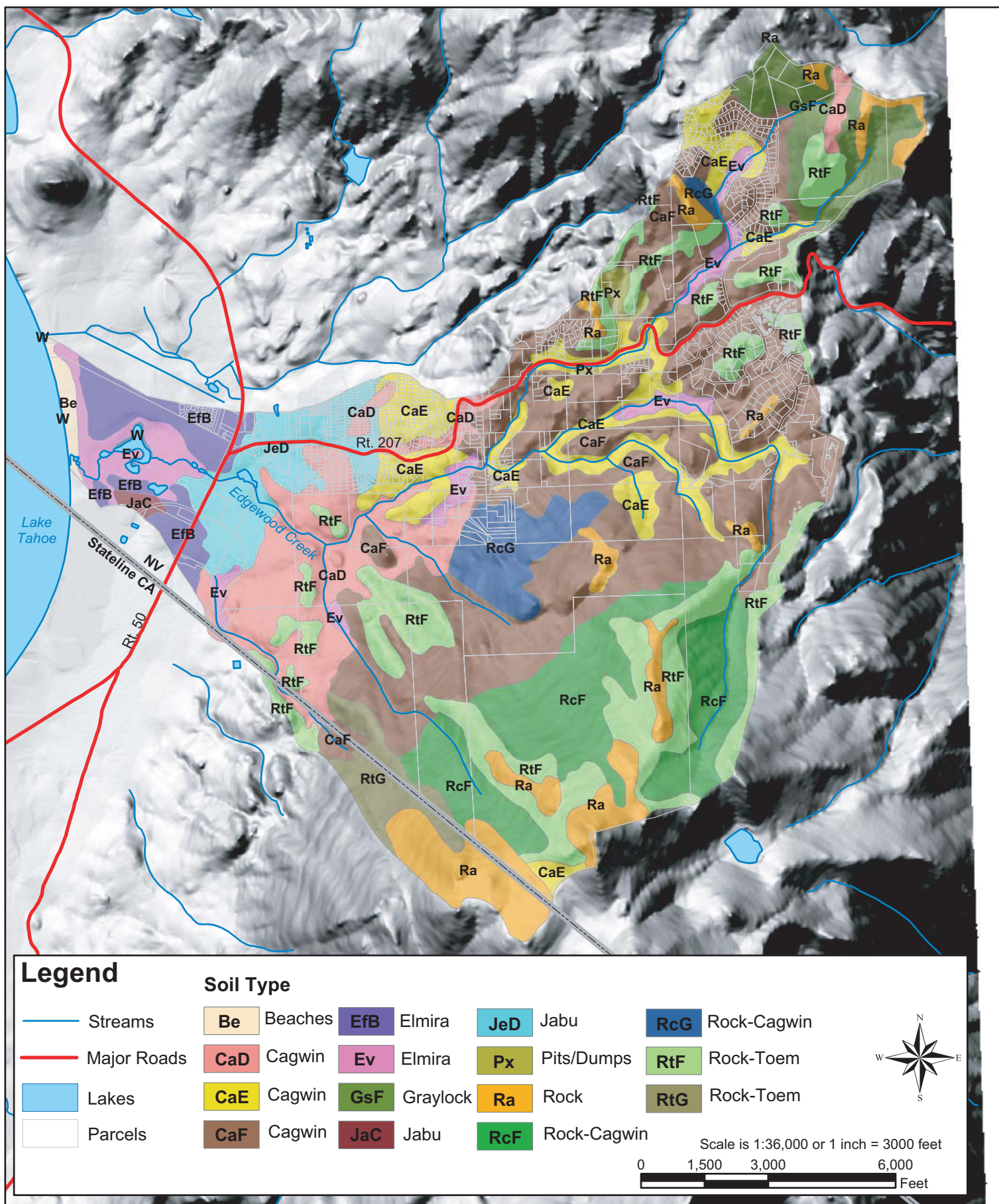







Table 5.1 - Soil Chart

Soil Type	Description	Slope Range (%)	Hydrologic Group	Area (acres)	% of Watershed	Erosion Hazard	Frost Heave	Road Limitations	Excavation Limitations	Dwelling Limitations
Be	Beaches		A	22	1	Slight	Slight	Severe	Severe	Severe
CaD	Cagwin	Rock outcrop, complex	5-10	C	387	9	Moderate	Moderate	Severe	Severe
CaE	Cagwin	Rock outcrop, complex	15-30	C	377	9	High	Moderate	Severe	Severe
CaF	Cagwin	Rock outcrop, complex	30-50	C	1,216	28	High	Moderate	Severe	Severe
EfB	Elmira	Loamy coarse sand	0-5	A	151	4	Slight	Moderate	Moderate	Slight
Ev	Elmira	Loamy, coarse sand, wet variant	0	D	172	4	Slight	Moderate	Severe	Moderate
GsF	Graylock	Extremely stony loamy coarse sand	30-50	A	161	4	High	Moderate	Severe	Severe
JaC	Jabu	Coarse sandy loam	0-9	B	11	0	Slight	Moderate	Slight	Slight
JeD	Jabu	Coarse sandy loam, shallow variant	5-15	D	194	5	Moderate	Moderate	Moderate	Moderate
Px	Pits/Dumps		D	22	1	Variable	Variable	Severe	Variable	Severe
Ra	Rock		D	312	7	Moderate	Moderate	Severe	Severe	Severe
RcF	Rock-Cagwin	Complex	30-50	C	441	10	High	Moderate	Severe	Severe
RcG	Rock-Cagwin	Complex	50-70	C	140	3	High	Moderate	Severe	Severe
RtF	Rock-Toem	Complex	30-50	C	570	13	High	Slight	Severe	Severe
RtG	Rock-Toem	Complex	50-70	C	97	2	High	Slight	Severe	Severe
Total				4271	100					





Hydrologic Groupings

- ☐ A - Soils have high infiltration rate when thoroughly wetted and moderately low runoff potential: chiefly deep, well-drained to excessively drained sands or gravel. These soils have a high rate of water transmission.
- ☐ B - Soils have moderate infiltration rate when thoroughly wetted and moderately low runoff potential: chiefly moderately deep and deep, moderately well drained and well drained soils that are moderately fine textured to moderately coarse textured and have moderately slow to moderately rapid permeability. These soils have a moderate rate of water transmission.
- ☐ C - Soils have slow infiltration rate when thoroughly wetted and moderately high runoff potential: chiefly well drained and moderately well drained soils that have a slowly to very slowly permeable layer (fragipan, hardpan, or bedrock) at a depth of 20 to 40 inches; soils that are moderately fine textured to fine textured; or soils that have a moderately high water table and may be somewhat poorly drained. These soils have a slow rate of water transmission.
- ☐ D - Soils have very slow infiltration rate when thoroughly wetted and high runoff potential: chiefly clays that have a high swell potential; soils that have a permanent high water table; soils that have claypan or clay layer at or near the surface; or soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Legend

-  Streams
-  Major Roads
-  Lakes
-  Parcels
-  Watershed Boundary

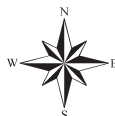
Erosion Hazard*

-  High
-  Moderate
-  Slight
-  Variable

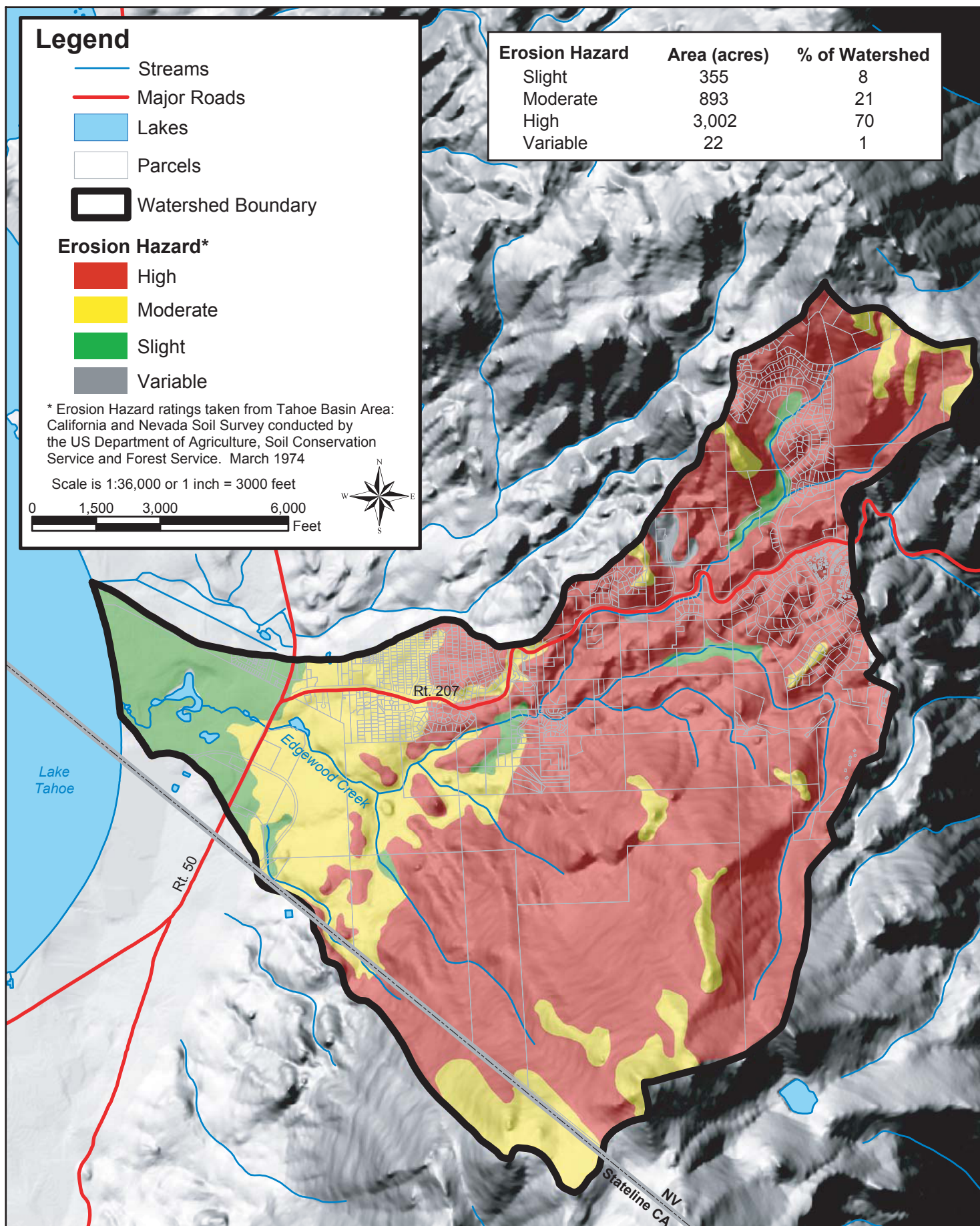
* Erosion Hazard ratings taken from Tahoe Basin Area: California and Nevada Soil Survey conducted by the US Department of Agriculture, Soil Conservation Service and Forest Service. March 1974

Scale is 1:36,000 or 1 inch = 3000 feet

0 1,500 3,000 6,000 Feet



Erosion Hazard	Area (acres)	% of Watershed
Slight	355	8
Moderate	893	21
High	3,002	70
Variable	22	1



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**Edgewood Creek Watershed
Soil Erosion Hazards**

**Figure
5.3**

Table 5.2 - Water Sampling Sites

Map #	Site #	Agency	Station Description	Station Type	Measured Parameter	Recording Period	Drainage Area (mi ²)
39	39-5AA	USFS	Kahle Ditch at Manhole Cover	SW		1988	N/A
40	39-5B	USFS	Kahle Ditch at Trailer Park	SW	NUT	1986	N/A
140	10336759	USGS	Edgewood Creek near Stateline, NV	SW QW	Q,QW,SUSP SED	1982-87	0.32
239	10336750 (HV-E1)	USGS	Edgewood Creek below South Benjamin Drive near Daggett Pass	SW MISC	Q,QW,SUSP SED	1989-CUR. YR.	0.73
240	10336756	USGS	Edgewood Creek Tributary near Daggett Pass, NV	SW QW	Q,QW,IO,MTL,SUSP SED,NUT	1981-83,89-CUR. YR.	0.8
241	10336757	USGS	Tributary of Edgewood Creek near Tahoe Village	SW QW	Q,IO,MTL,SUSP SED,NUT	1981-83	N/A
242	10336758	USGS	Edgewood Creek Tributary at Highland Drive near Tahoe Village, NV	SW QW	Q,IO,MTL,SUSP SED	1981-83	N/A
243	103367585	USGS	Edgewood Creek at Palisade Drive near Kingsbury	SW IPES	Q,QW,SUSP SED,NUT	1989-CUR. YR.	3.13
244	103367592	USGS	Eagle Rock Creek near Stateline, NV	SW IPES	Q,QW,SUSP SED,NUT	1989-CUR. YR.	0.63
245	103367595	USGS	Sediment Catchment Basin near Tahoe Village	SW QW	Q,QW,SUSP SED	1985	N/A
246	10336760	USGS	Edgewood Creek at Stateline	SW		1967-74	5.61
247	10336761	USGS	Edgewood Creek below Hwy. 50 near Stateline, NV	SW QW	Q	1984-85	N/A
248	10336765	USGS	Edgewood Creek at Lake Tahoe near Stateline, NV	SW	Q,PH,IO,MTL,NUT	1984-CUR. YR.	6.57
262	385756119565001	USGS	90 N13 E18 27BAC1 Edgewood2	GW QW		1987	N/A
264	385808119564201	USGS	90 N13 E18 22CDD1 Edgewood3-1	GW QW		1987	N/A
265	385808119564202	USGS	90 N13 E18 22CDD2 Edgewood3-2	GW QW		1987	N/A
266	385812119545101	USGS	90 N13 E18 24CC	GW			N/A
269	385816119563001	USGS	90 N13 E18 22DCA1 Edgewood4	GW QW		1987-CUR. YR.	N/A
282	385909119532801	USGS	90 N13 E19 18CDB1 Andria	GW QW		1986	N/A
345	337	SCS	Daggett Pass	SC		1916-69	N/A
346	HV-E2	Heavenly Valley	Edgewood Creek 1/4 mile downstream of parking lot near Daggett Pass	SW MISC	Q,SUSP SED, NUT	1997	N/A

GW = Ground Water

IPES = Individual Parcel Evaluation System

IO = Industrial Outflow

MTL = Metals

NUT = Nutrients

PH = pH

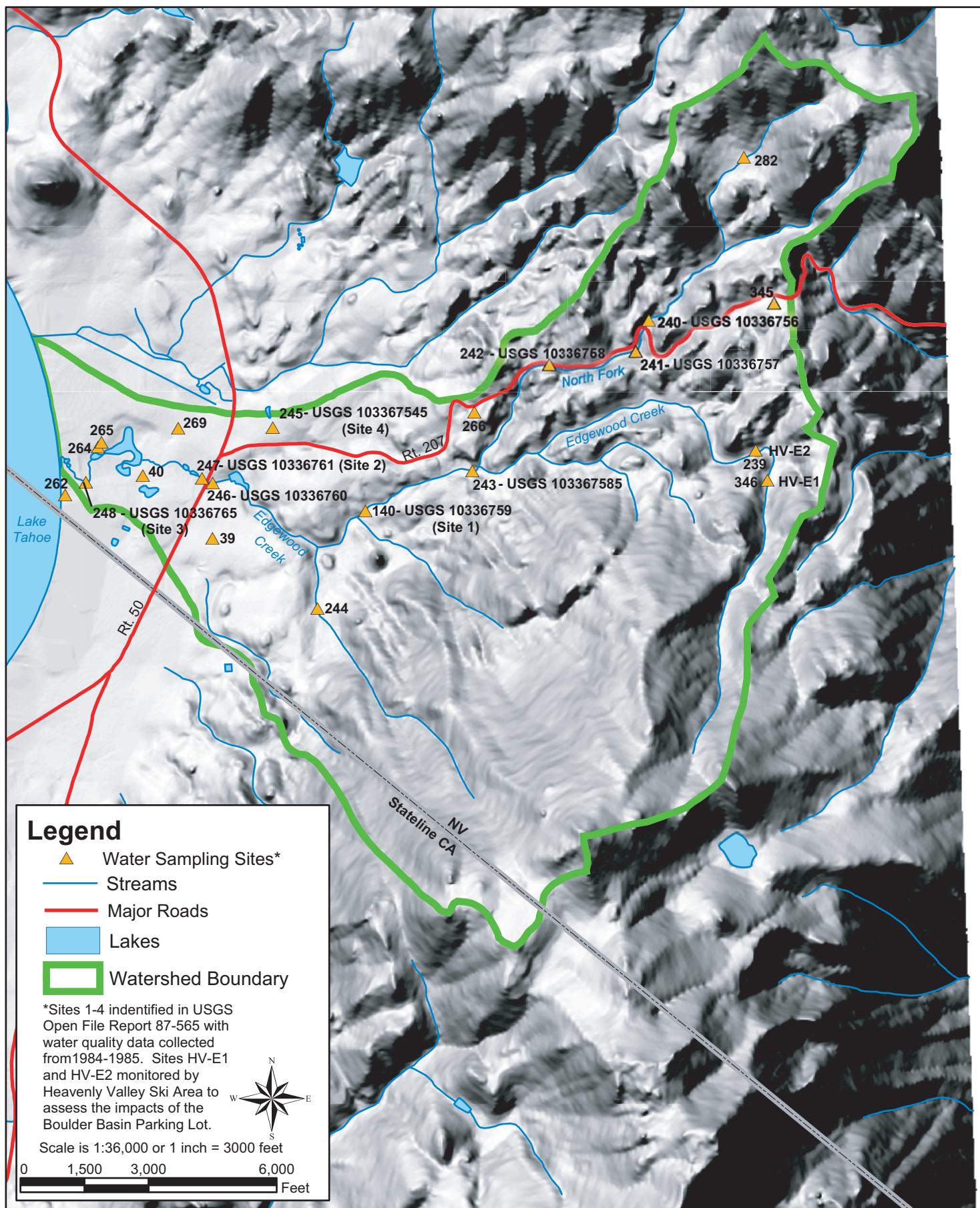
Q = Flow

QW = Water Quality

SC = Specific Electrical Conductance

SUSP SED = Suspended Sediment

SW = Surface Water



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Edgewood Creek Watershed Stream Flow and Water Quality Sampling Stations

Figure
 5.4

Monthly Exceedance Probabilities												
Month	Exceedence Probability	Flow (cfs)		Month	Exceedence Probability	Flow (cfs)		Month	Exceedence Probability	Flow (cfs)		
January	90	0.4		February	90	0.4		March	90	0.6		
	80	0.5			80	0.5			80	0.7		
	70	0.5			70	0.6			70	0.8		
	60	0.6			60	0.7			60	1.0		
	50	0.7			50	0.7			50	1.9		
	40	1.4			40	1.7			40	2.3		
	30	1.9			30	2.2			30	2.7		
	20	2.1			20	2.3			20	3.2		
10	2.6	10		2.6	10	3.8						
April	90	0.8		May	90	0.6		June	90	0.3		
	80	1.0			80	0.7			80	0.3		
	70	1.3			70	0.9			70	0.5		
	60	2.0			60	1.9			60	0.7		
	50	2.7			50	2.6			50	1.3		
	40	3.2			40	3.3			40	1.9		
	30	3.8			30	4.1			30	2.4		
	20	4.3			20	4.9			20	3.1		
10	5.2	10		6.3	10	4.2						
July	90	0.2		August	90	0.1		September	90	0.2		
	80	0.2			80	0.2			80	0.2		
	70	0.3			70	0.3			70	0.3		
	60	0.5			60	0.4			60	0.4		
	50	0.9			50	0.7			50	0.6		
	40	1.3			40	0.9			40	0.9		
	30	1.5			30	1.1			30	1.2		
	20	1.7			20	1.3			20	1.3		
10	2.1	10		1.6	10	1.5						
October	90	0.2		November	90	0.4		December	90	0.3		
	80	0.3			80	0.4			80	0.4		
	70	0.4			70	0.4			70	0.5		
	60	0.4			60	0.5			60	0.5		
	50	0.7			50	0.9			50	0.7		
	40	1.0			40	1.0			40	1.3		
	30	1.4			30	1.7			30	1.8		
	20	1.6			20	1.9			20	2.0		
10	1.8	10		2.2	10	2.2						
Estimated Peak Discharges for Different Recurrence Interval Events												
2 - Year Event: 11 cfs					50 - Year Event: 114 cfs							
5 - Year Event: 28 cfs					100 - Year Event: 153 cfs							
10 - Year Event: 44 cfs												

Table 5.3: Monthly exceedance probabilities and estimated peak discharges for USGS Gage 103367585, Edgewood Creek at Palisades Drive near Kingsbury, Nevada. Data is available from this gage from 1991 to 2000. Exceedance probabilities are calculated by sorting all available mean daily flow values by month. Exceedance probabilities give information about how often a certain flow value is exceeded. For example, in August, at the gage location, the flow exceeds 0.7 cfs 50% of the time and 0.1 cfs 90% of the time. This data is extremely valuable when assessing fish passage or the potential impacts of streamflow diversions. It also has dry season predictive capabilities given a particular baseflow value at the end of the high flow season.

As an initial assessment, we will conduct an initial walk of the primary stream channels in the watershed where we will qualitatively describe and map channel conditions. Following the initial survey, detailed study reaches will be established to collect enough information about the channel and channel conditions to quantitatively estimate the magnitude and implications of each impact. The USGS study, conducted between 1983 and 1988, provides an excellent baseline dataset to determine how conditions have changed over the past 15 years. Reductions in sediment supply as a result of improved land use practices or improvement projects conducted in the basin could potentially be detected and quantified by repeating some of the data collection efforts. Conversely, further degradation of the watershed can also be detected through similar comparisons.

Given existing information, we propose to replicate some of the work conducted by the USGS in the mid-1980's. Our effort will include:

- Reach Breaks: The reach breaks selected in the USGS study are based on gage locations, tributary inputs, and channel morphology. Unless decided upon otherwise in the field, we propose using these same reach breaks with additional reaches delineated in the lower watershed based on tributary inputs and breaks in slope.
- Cross-sections: Reoccupy as many cross-sections as possible to compare historic and existing geometry. According to the USGS report, the cross-sections were monumented with metal stakes for the purpose of being reoccupied in the future. To repeat these cross-sections, we will require additional information on the exact locations along with the raw cross-section data. The summary report only provides information on plus or minus changes in cross-section elevation.
- Bank erosion lengths: Bank erosion lengths will be estimated in all survey reaches and compared to the 1983-1987 results.
- Grain-size distribution: Pebble counts will be conducted to describe the grain-size distribution of bed and bar features. Additionally, bed samples will be collected and sent to the lab to determine origin (i.e. – applied road abrasives, native soil, etc).
- Erosion pins: Attempts will be made to locate and resurvey the erosion pins established by the USGS survey. To accomplish this, we will need additional information from the USGS to locate the pins.

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6.0 PRELIMINARY WATER QUALITY REPORT

The Edgewood Creek Watershed water quality analysis is focused upon the factors that affect aquatic habitat quality and aquatic productivity. The water quality factors that are potentially impairing include:

- Overloading the stream with fine sediment sands and silts that can dominate streambed substrate and in some cases fill the stream channel causing lateral and vertical geomorphic instability. The main source of excess sediment is from land disturbed by development (primarily roads), stream channel erosion and discharge from applied road abrasives.
- Temperature and dissolved oxygen are factors important to fish survival as well as macro invertebrate productivity. Problems may result from low stream flow, lack of overstory riparian vegetation, stagnant circulation or eutrophication due to overloading of nutrients. Urban landscapes can impact stream corridors by removing overstory canopy and introducing fertilizer, sewage and organic debris.
- Nutrients: Excess nutrients (Nitrogen -N, Phosphorous-P) and biologically reactive Iron (Fe) delivered from numerous sources to the stream can cause acceleration of algae growth and loss of oxygen in the water column to bacterial respiration.
- Toxic contaminants such as oil and grease, salts, metals, hydrocarbons and pesticides are found in urban stormwater runoff and can seriously deteriorate aquatic biological

productivity and other beneficial uses of water. Since significant areas of Edgewood Creek are urbanized, it is possible that there are periodic toxic discharges.

The water quality section of the Edgewood Watershed Assessment will focus on instream factors affecting aquatic ecology related to sediment sources, water chemistry (dissolved oxygen, temperature, pH) and the potential sources of pollution within the watershed. An initial field assessment has revealed that sediment is the most significant water quality problem affecting aquatic habitat, however the presence of significant areas of urbanizing lands does hold the possibility of other contaminants reaching the stream.

A review of existing data is described below followed by recommendations for Phase 2 data collection and other future efforts. The following summary describes the content of existing data collected to date. Some available data that has not yet been delivered (e.g. water quality data from Edgewood Golf Course) or the data received is not well documented and we are awaiting more information. All water quality data taken to date have been “grab samples” which documents only a small fraction of the time and usually not in enough detail to quantify overall conditions. Moreover, there has been no specific correlation of water quality to aquatic habitat quality, thus there is no data on specific effects. However, there is abundant visual evidence of an oversupply of sediment in stream channels and erosional sources along road and developed areas.

The existing water quality information includes several focused water quality investigations (e.g. Heavenly Valley Ski Area and Edgewood Golf Course) with the balance being generalized data collection programs conducted by the U.S. Geological Survey at individual stream gage sites and/or the Lake Tahoe Integrated Monitoring Program (LTIMP). The following is a description of available water quality data collected to date. Prior to completion of the final Tech Memo I, the project team will develop a recommendation of how to summarize and integrate existing data into the GIS database.

- USGS. Effects of Erosion-Control Structures on Sediment and Nutrient Transport, Edgewood Creek Drainage, Lake Tahoe Basin, Nevada 1981-1983 Report #WRIR 87-4072. (by Kerry T. Garcia):

This report examined the effects of erosion control structures on sediment and nutrient discharges to three erosion control structures located in the Edgewood Creek watershed. Significant reductions in sediment yield, nutrient runoff and dissolved iron were recorded after installation of the structures in 1982-83. The data collected represented 1.2 square miles of the Edgewood Creek watershed and included before and after construction of erosion control structures, and an unchanged site for control. The data collected included: bedload sediment (sand and coarser) and suspended load (fine sand size and smaller), Nitrogen (nitrate, nitrite, ammonia, organic nitrogen, total Nitrogen), Phosphorous (orthophosphate and Total P) and Iron (all forms).

It may be possible to revisit these sites, assess the condition of the structures and, if funding and opportunities arose, conduct a renewed sampling. This would provide insights as to how

effective the structures are after 20 years of service and whether the reductions documented in this report have been sustained.

- USGS Long-Term Water Quality Monitoring within Edgewood Creek Watershed. (See Table 5.3-1). and Timothy G. Rowe, Dina K. Saleh, Sharon A. Watkins, and Charles R. Kratzer (USGS) Streamflow and Water-Quality Data for Selected Watersheds in the Lake Tahoe Basin, California and Nevada, through September 1998, Water-Resources Investigations Report 02-4030

The U.S. Geological Survey has collected water quality grab samples at multiple stream gage locations in Edgewood Creek since the early 1980s. Figure 6 shows the location of water quality sampling stations and Table 5.3-1 shows the years of record at each site. A summary assessment of water quality data collected between 1988 and 1998 under the Lake Tahoe Interagency Monitoring Program (LTIMP) was completed by Rowe, et al in 2002. The sampling data used in the analysis of Edgewood Creek was taken between 1992 and 1998.

The data collected includes a host of N and P constituents as well as Fe, sediment (suspended load and turbidity), physical factors (temperature, Do, conductivity, pH), and streamflow. All of this data is available in digital format from the USGS.

The data assessment conducted by Rowe, et al (2002) includes calculations of total loads, yields and trends for Edgewood Creek and other watersheds in the Lake Tahoe basin. Five stations in Edgewood Creek were included in the analysis (See Figure 5.4) and included the constituents and observations shown on Table 6.1. Computer programs (FLUX and ESTIMATOR) were used to extrapolate grab sample data and to correlate various measured constituents and parameters with streamflow. Edgewood Creek rated high in concentration of nutrients, maximum temperature and pH readings, however total nutrient loads were moderate compared to the rest of the basin due to nearly the lowest streamflows per acre in the Tahoe Basin watershed. However, loading rates for biologically reactive iron was found to be the second highest in the Tahoe Basin (note: the study of erosion control structures [WRIR 87-4072] listed above found strong correlation between sediment discharge and iron therefore reducing sediment discharge should help reduce iron discharge).

Rowe et al (2002) assessed trends in constituent loading for Edgewood Creek and found that it was a leader in suspended sediment discharge per square kilometer and fairly high for other constituents (Fe, N and P) (See Table 6.2). The assessment also examined trends within Edgewood Creek and these are presented in Table 6.2. There is no discussion of the reasons or significance of trends or loading yields.

The Rowe et al (2002) provides the best information available supporting our initial assessment that sediment supply is high in Edgewood Creek likely due to accelerated erosion off of roads and urban areas. It also shows that water runoff and sediment flushing flows that could counteract the overloading of sediment are relatively low, probably due to drier precipitation and fairly absorbent (but highly erodible) soils.

- USDA, Pacific Southwest Region and Research Station, TRPA, UNR, DRI, The Lake Tahoe Watershed Assessment, February 2000.

The Lake Tahoe Watershed Assessment was mandated by President Clinton as a result of the 1997 Presidential Summit on Lake Tahoe. It provides an overview of environmental and socio-economic conditions in an effort to coordinate and focus research efforts and the activities of numerous agencies involved in land management in the Tahoe Basin.

The document provides general information about water quality problems and development in the Lake Tahoe Basin, including the effects of urbanization on water quality and stream and watershed ecosystems. But there is little specific to Edgewood Creek in comparison to other documents cited herein.

- Great Basin Laboratories, Inc. (by John E. and James A. Sabatini) Data on surface-water quality and quantity Edgewood Creek, Douglas County, Nevada 1990

This report consists of raw grab sample data for Temperature, pH, EC, turbidity, TKN, NO₃-N, PO₄ (O), PO₄ (T) but the locations and reasons for data collection are not provided. SH&G and WRC-Nevada are attempting to find additional information. Great Basin Laboratories was apparently bought out at some point. Given this and the time that has transpired since publication, we are not confident of being able to use this dataset. Despite this, other data and assessments described herein are adequate for the objectives of the watershed assessment.

- U.S. Department of Agriculture Forest Service (April 1995) Heavenly Valley Ski Resort Master Plan Draft Environmental Impact Report/ Environmental Impact Statement.

Heavenly Valley Ski Resort prepared a Master Plan proposal in December 1993 which included plans to expand facilities in California and Nevada. A steering committee comprised of TRPA, Douglas and El Dorado Counties, U.S. Forest Service developed and approved a set of master plan development options that were then used for preparation of an EIR/EIS document. The EIR/EIS was circulated in 1995.

One area of potentially significant environmental impacts was related to the hydrology and pollutant discharge to Edgewood Creek and the effect upon aquatic ecosystems and the clarity of Lake Tahoe. The potentially affected area included the upper 358 acres of Edgewood Creek which is underlain by erosive granitic-rock derived soils and includes 1.3 miles of perennial stream and 2,390 feet of elevation drop. Water quality sampling was conducted (and continues to be conducted by USFS) above and below the Boulder Lodge parking lot by RCI (assume Resource Concepts Incorporated). The initial premise was to document the effect of the parking lot on water quality, but additional urban land in the subwatershed of the lower sampling site obscured the results. [See Hazelhurst and Widegren 1997 below].

TABLE 6.1 - LTIMP surface-water sample analysis; constituents, abbreviations, parameter codes, and reporting levels

[Total nitrogen = total organic plus ammonia nitrogen (TKN) plus dissolved nitrite plus nitrate ($\text{NO}_2 + \text{NO}_3$); soluble reactive phosphorus (SRP) = dissolved orthophosphate phosphorus. Abbreviations: mg/L, milligrams per liter; $\mu\text{g/L}$, micrograms per liter; $^{\circ}\text{C}$, degrees Celsius; ft^3/s , cubic feet per second; $\mu\text{S/cm}$, microsiemens per centimeter]

Constituent	Abbreviation	Parameter code	Reporting level
Nutrients			
Dissolved nitrite plus nitrate nitrogen	$\text{NO}_2 + \text{NO}_3$	00631	0.002 mg/L
Dissolved ammonia nitrogen	NH_4	00608	0.003 mg/L
Total organic plus ammonia nitrogen (Kehldahl)	TKN	00625	0.035 mg/L
Soluble reactive phosphorus	SRP	00671	0.001 mg/L
Total phosphorus	TP	00665	0.002 mg/L
Biologically reactive iron	BFe	46568	3.0 $\mu\text{g/L}$
Sediment			
Suspended-sediment concentration	SS	80154	1 mg/L
Suspended-sediment discharge	SSQ	80155	0.01 tons/day
Sand break (higher suspended-sediment concentrations only)		70331	1 percent finer
Field Measurements			
Water temperature	WT	00010	0.5 $^{\circ}\text{C}$
Air temperature	AT	00020	0.5 $^{\circ}\text{C}$
Gage height	GH	00065	0.01 ft
Instantaneous discharge	Q	00061	0.01 ft^3/s
Specific conductance	SC	00095	1 $\mu\text{S/cm}$
pH		00400	0.1 units
Dissolved oxygen	DO	00300	0.1 mg/L
Barometric pressure	BP	00025	1 mm
Dissolved oxygen (saturation, percent)	DO%	00301	1 percent
Weather (clear, cloudy, rain, snow, thunderstorm)		00041	
Hydrologic event (routine, storm, snowmelt)			
Stage conditions (stable, rising, falling)			
Sample method (equal width increment, dip)		82398	
Sampler type (depth-integrated, handheld 48/81/59; depth-integrated 74)		84164	
Sample collecting agency		00027	
Sample analyzing agency		00028	

Reference: Timothy G. Rowe, Dina K. Saleh, Sharon A. Watkins, and Charles R. Kratzer (USGS) Streamflow and Water-Quality Data for Selected Watersheds in the Lake Tahoe Basin, California and Nevada, through September 1998, Water-Resources Investigations Report 02-4030

**Table 6.2 - Water Quality Loading Rates to Lake Tahoe and Rankings for Edgewood Creek
for water years 1992 - 1998**

Constituent	Loading Rate (kg/month)	Yield (kg/km ²)	Yield Ranking ²	Trend (p-value) ¹
Dissolved Nitrite plus Nitrate Nitrogen	5.20	0.36	5 out of 10	Decreasing (0.05<p<0.10)
Dissolved Ammonia	1.72	0.12	1 out of 10	Undetected
Total Nitrogen	53.10	3.66	3 out of 10	Decreasing (p<0.05)
Soluble Reactive Phosphorous	3.82	0.26	2 out of 10	Decreasing (p<0.05)
Total Phosphorous	14.60	1.01	3 out of 10	Decreasing (p<0.05)
Biologically Reactive Iron	233.00	16.10	3 out of 10	Decreasing (p<0.05)
Suspended Sediment	4450.00	307.00	3 out of 10	Decreasing (0.05<p<0.10)
		Overall ranking ³ = 4 out of 10		

1. p value <.05 = significant trend; p value >.05 to <.10 = less-significant trend; p value >.10 = no significant trend;

2. Rankings based on a comparison with 10 LTIMP stations surrounding Lake Tahoe. Incline, Third, Ward, Blackwood, General, Upper Truckee, Edgewood, Trout, Logan-House, and Glenbrook Creeks were used in this comparison. 1 = the highest monthly yield of constituent, 10 = the lowest monthly yield of constituent. (i.e. '3 out of 10' means Edgewood Creek has the 3rd highest monthly constituent yield of the 10 compared watersheds). The study was conducted to assess basin priorities for reduction in constituent loads to Lake Tahoe. The next step would be to assess the amount that can be controlled, which is dependent upon land use, the physical condition of the watershed, and human versus natural background rates.

3. Overall ranking determined by averaging the yield ranks of all seven constituents for each watershed and then ranking these averages.

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The EIR/EIS used a Cumulative Watershed Effects (CWE) methodology to determine the relative sediment production from roads in upper Edgewood Creek and whether land use disturbance and sediment is impacting streams. It was determined that the level of development in Edgewood as measured by Equivalent Roaded Areas (ERAs) had exceeded the Threshold of Concern (TOC), the point after which cumulative impacts occur, by over 50%. A series of mitigation techniques were developed to reduce erosion and sediment delivery to Edgewood Creek for 4.7 of 5.22 acres of roads in the 385 acre watershed, including installing retaining walls, rip rap placed over exposed soils, roughen hillslope surfaces to reduce flow velocities and provide moisture for vegetation establishment, installation of runoff interception trenches and water bars, revegetation and mulching exposed soils.

Subsequent monitoring of the stations above and below the Boulder Lodge parking lot has been performed by the USFS [See Hazelhurst and Widegren 1997] and the lower station has become the USGS station Edgewood Creek tributary near Daggett Pass (station #10336756; record 1991-2000). A 1997 report by Hazelhurst and Widegren (1997) found that suspended sediment concentrations and turbidity increased below the parking lot, and in several cases exceed Nevada State and TRPA Standards. Discharge of Iron also exceeded Nevada Division of Environmental Protection Standards.

The State of Nevada (Division of Environmental Protection, Water Quality Planning) recently released the Draft 2002, 303(d) impaired waterbodies list. Rivers, lakes and streams throughout the State are targeted because the beneficial uses of the waterbody are not being supported or water quality standards are continually not being met. Nevada's 2002, 303(d) List of Impaired Waterbodies includes 5.37 miles of Edgewood Creek, due to continually elevated levels of total iron, as measured by the USGS.

It is unknown whether the USFS has continued this sampling (we are in the process of finding out) and whether any corrective measures have been taken to reduce or eliminate violations of water quality standards. SH&G and WRC will continue to investigate this issue.

This information does provide good insights into the potential impacts of roads and runoff from roads in producing sediment that can negatively impact stream ecosystem. Although the EIR/EIS was concerned with the very upper watershed area, the CWE analysis and mitigation program provide a good basis for measuring the effects of sediment reduction, which might be applied to the Edgewood Creek Watershed assessment.

- Hill, B.R., J.R. Hill and K. Michael Nolan (1990): Sediment-source data for four basins tributary to Lake Tahoe, California and Nevada August 1983-June 1988 USGS Open File Report 89-618

This report examined sediment generation on hillslopes and in stream channels for the upper 3.0 square miles of Edgewood Creek. The study involved mapping of sediment sources areas (gullies and eroding hillslopes), measurement of erosion using erosion pins and volumetric

changes in channels. A more detailed review of this document is provided in Chapter 5 Preliminary channel stability report.

6.1 RECOMMENDATIONS FOR PHASE 2 DATA COLLECTION

The Phase 2 data collection effort will involve mapping and evaluating sediment sources in the watershed and along specific stream reaches with specific documentation of stream conditions above and below major sediment source areas. This will generate baseline information necessary to measure the future effects of erosion and sediment control projects designed to reduce sediment input, improve aquatic habitat quality and improve channel stability.

During the course of data review it became evident that other water quality factors such as biologically reactive iron and nutrient discharges are of interest to clarity of Lake Tahoe; these factors may not be a significant factor in aquatic habitat quality unless they reach a point where dissolved oxygen is impaired. The focus on reduction of sediment sources and erosion will likely aid reduction of iron discharge and some of the constituents affecting the clarity of Lake Tahoe. In the course of conducting stream surveys, any significant water quality problem encountered (physical, toxic contaminants, etc.) will be documented and if appropriate, water samples will be collected for lab analysis. We will also be prepared to conduct physical measurements of water quality (temperature, pH, DO, etc.) using a portable meter if indications are present during our survey of significant problems.

Water quality sampling programs such as LTIMP and USGS data collection programs based upon limited grab samples are subject to great variability and potential error. Understanding the dynamics of nutrient and sediment loading into streams and into Lake Tahoe will require a system of continuous water quality sampling which is beyond the scope of this Watershed Assessment. In order to more intricately identify sources of nutrients, toxic contaminants or other non-sediment pollution a set of continuous monitoring and sampling stations is needed. This would include continuously recording turbidimeters, pH and conductivity meters and automatic samplers that draw water samples on a volumetric or threshold basis (i.e. flow volume, flow rate or triggered by exceedence of specific parameter (e.g. turbidity or EC). This instrumentation and set up is similar to that being implemented by the City of South Lake Tahoe on Trout Creek and the Upper Truckee River.

The only new source of water quality information acquired since Technical Memo I draft is a water quality summary prepared by Resource Concepts, Inc. (RCI [2002]), on behalf of Park Cattle Company (PCC) dated October 1, 2002. The document summarizes data from thirteen years of monthly water quality samples and four years of individual storm events. The samples were collected from a set of sites located upstream, within and downstream of the Edgewood Creek Golf Course property. The data presented in the report is the statistical 90th percentile values at each site for each sample type (monthly or storm).

RCI (2002) concludes that based upon a summary of data collected over a 13 year period, off-site pollutant loads of dissolved nutrients and sediments are successfully treated and contained within the in-channel pond system on the golf course property, thereby reducing pollutant loading to Lake Tahoe.

Resources Concepts Incorporated (2002): Water Quality Sampling Program for Edgewood Golf Course, Unpublished report

7.0 PRELIMINARY FISHERIES AND AQUATIC HABITAT REPORT

This report summarizes information available on the fishery and aquatic habitat of the Edgewood Creek watershed. Information was solicited from several sources, including the U. S. Forest Service (USFS), the Nevada Division of Wildlife (NDOW), and the Tahoe Regional Planning Agency (TRPA), among others. The following information was reviewed and analyzed in the preparation of this report:

- Frantz, T. 1982. Report on condition of Edgewood Creek. NDOW internal report.
- USDA Forest Service. 1991. Fisheries resource analysis report for Heavenly Valley Ski Area. Lake Tahoe Basin Management Unit report, South Lake Tahoe, CA.
- USFS Forest Service. 2002. Fish distribution GIS layer.
- Tracy, J. H. and A. Rost. 2002. Assessment of the hydrologic condition of Lake Tahoe's tributaries. Draft report. Watersheds and environmental sustainability center, Desert Research Institute, Reno, NV.
- Snider, W. M., J. L. Kershner and G. E. Smith. 1987. Instream flow requirements of selected salmonid resources: Lake Tahoe Basin, California and Nevada. California Department of Fish and Game Stream Evaluation Report No. 87-1.
- TRPA. 2001. Edgewood Creek EIP stream assessment. Unpublished report, Tahoe Regional Planning Agency, Zephyr Cove, NV.
- Resource Concepts, Inc. 1992. Edgewood Creek fish habitat enhancement project Corps of Engineers permit application. Sacramento District, Sacramento, CA.

The USFS has conducted habitat and channel typing surveys on Edgewood Creek. However, these data were not available for this report and will be summarized in a subsequent draft. Also, additional information on fish stocking in the drainage is likely available from NDOW. This information was not available for this report and will be summarized in subsequent drafts.

7.1 FISHERY

Frantz (1982) summarized what was then known about the Edgewood Creek fishery. Because of numerous migration barriers, there was probably not a migratory fishery in the creek at that time. The only salmonid sampled in electrofishing conducted throughout the watershed in 1972 were brook trout, which were found only in the middle portion of the stream, above Highway 50 and below the major tributary entering from the north along Kingsbury Grade. One brook trout was

also found in Lapham Creek, the first major tributary from the south upstream of the Highway 50 bridge.

Speckled dace and Lahontan reddsides were the only other fish mentioned in the 1972 survey, and were only found downstream of the Edgewood golf course ponds. They were not found at the next electrofishing section upstream, above Highway 50. The limited distribution of these fishes suggests that they were migrants from the lake, spawning in the lowest portion of the stream where migration was not blocked. A barrier to dace and reddsides passage probably existed either on the golf course or at the Highway 50 bridge. It is not known if the current distribution of dace and Lahontan reddsides has changed since the 1972 survey.

Rainbow trout were stocked throughout the watershed in 1973. A total of 15,500 Shasta-strain fingerlings were planted in the major northern tributary and in the mainstem below the Boulder Lodge parking area on Heavenly Ski area. Although the Frantz 1982 report does not comment on whether this planting was successful, the current USFS database shows rainbow occurring throughout much of the mainstem downstream of Boulder Lodge.

Whether these rainbows are descendents of the fish planted directly in the stream by NDOW or are the result of spawning by migratory lake-resident fish is unclear. The lower 2.4 miles of the mainstem are currently classified by TRPA as a migratory fishery; the remainder of the mainstem and the tributaries are classified as a resident fishery. The TRPA classification is likely based on the potential for the habitat to support a migratory fishery rather than known occurrences of migratory fish. Lakewide, the abundance of adfluvial (lake-run) rainbow trout has probably increased significantly since the early 1970's due to the success of propagation programs by both NDOW and the California Department of Fish and Game (CDFG), but no data are available to assess the use of Edgewood Creek by these fish.

7.2 HABITAT

Important components of fish and aquatic habitat in Edgewood Creek are the physical stream channel, instream flow, and barriers to fish migration. These three areas are discussed separately below.

7.2.1 *Stream Channel*

Frantz (1982) notes that significant disturbance to the stream channel has occurred in the area of the Boulder Lodge. The parking lot for the lodge was constructed by placing fill in the original stream channel. Riparian vegetation in this area and upstream, where a ski run was constructed around the channel, was removed or highly modified.

Roads have also had a major impact on the physical stream channel. The major tributary to Edgewood Creek that enters from the north (NE ¼ of Section 25) runs next to Kingsbury Grade (SR 207) for about one-half mile. Throughout much of this length, the creek was probably either moved during road construction or was impacted through disturbance of riparian vegetation. US 50 West crosses the mainstem about one mile upstream from the mouth. The creek is in a large culvert under the road. Several smaller crossings are located upstream of US 50 West; some are bridges, and have little impact on the channel. However, culvert crossings around Palisades Drive have highly altered the channel.

Construction of the Edgewood golf course also substantially altered the historic condition of the physical stream channel. The stream was moved to accommodate golf course infrastructure and constructed ponds. Nearly all the historic riparian habitat was replaced with golf course landscaping.

Miscellaneous other disturbances have altered the historic condition of the channel. Just upstream of the Highway 50 crossing, a pond is located in the former stream channel. Created by a small earthen dam, the pond outlet is a culvert buried in the dam. Other ponds were noted by TRPA (2001), though it is not clear how these ponds affected the historic channel. Several smaller paths and crossings were noted during the 2001 TRPA survey.

Frantz (1982) noted that some areas of the stream had serious bank erosion, though the location of these areas was not given. The TRPA survey, conducted in 2001, found localized areas of erosion but streambank stability did not appear widespread. It is possible that much of the erosion noted by Frantz was occurring in the lower part of the stream, on the Edgewood golf course. A permit application for a stream improvement project on Edgewood property, submitted in 1992 (Resource Concepts, Inc. 1992), states that one of the reasons for undertaking the project was to repair unstable streambanks. Preliminary reviews of the project area suggest that this project was successful at stabilizing streambanks, perhaps addressing much of the problem noted by Frantz.

Apart from the direct disturbance noted above, roads in the watershed appear to have impacted stream habitat in other ways. Frantz (1982) noted that the creek has been used as a storm drain for highways, streets and parking lots. Our preliminary surveys suggest this practice has resulted in aggradation and modification of channel substrate, reducing the value of aquatic habitat for fish and other aquatic animals. These impacts are most pronounced near the roads, where sand from deicing operations appears to enter the channel.

7.2.2 Instream Flow

Frantz (1982) noted that at least six water rights had been filed for the stream in 1982, mostly for irrigation, domestic or stock uses, though some were for either quasi-municipal or commercial use. Although there is no summary of the season or total volume applied for, the total rate of diversion under these filings was 11.5 cubic feet per second. During the great majority of the year, this amount of water is not available in the creek (and probably not available at all in dryer years). Frantz recommended that some consideration should be given for reduction of water rights, or transfer to the lake.

TRPA is currently funding a study by the Desert Research Institute (DRI) to evaluate the hydrologic condition of streams in the Tahoe basin. A preliminary draft of the report was available for this memorandum, but contained little information specific to Edgewood Creek. Future work on this study should provide additional detail on the potential impacts of flow diversion on aquatic habitat.

7.2.3 Fish Migration Barriers

Prior to the work done on Edgewood Golf Course in the early 1990's, it appears that several barriers to fish migration probably existed. The permit application for the project cites fish migration as the reason for some of the improvements. Though this project addressed many of the fish passage concerns, it appears that the mouth of the creek remains a passage problem. The creek is currently in a culvert, and passage is not possible at all flows or lake levels. The golf course is currently planning improvements to this culvert.

We conducted a preliminary review of the US 50 West culvert upstream of the golf course. While the culvert is not a complete barrier to passage of all fish, it probably impedes passage of smaller fish at higher flows, as well as passage of larger fish during low flows. This culvert could therefore be a barrier to fall-spawning salmonids and to native minnows that spawn in the spring and summer.

Descriptions of the instream pond upstream of the US 50 West crossing suggest that it is a migration barrier, though we have not yet conducted a site review. Culverts further upstream, near Palisades Drive, are certainly barriers to passage, at least for some species during part of the year. Although this is near the upstream end of the migratory portion of the channel, habitat upstream may be suitable for migratory fish.

7.3 FURTHER ASSESSMENT

Further review of existing information will include:

- Analysis of USFS habitat typing database. Information in this database may be useful in assessing the hypothesized impacts of roads on the stream channel.
- Analysis of historic aerial photographs. Sequences of aerial photographs will be analyzed to assess changes in the stream channel and in riparian habitat.

Subsequent field surveys will include:

- A survey of most of the main stem channel. This survey will concentrate on identifying potential stream and habitat restoration and enhancement projects; the occurrence of spawning and rearing habitat for migratory fish; potential aquatic habitat impacts from land-use activities, and a more detailed review of diversion points than has been done in previous studies. Locations for more detailed habitat analysis will also be selected. During this survey, salmonid spawning habitat will be assessed and mapped based on substrate and flow characteristics. Information from past studies, such as the Frantz review or the TRPA review mentioned above, will be used to focus efforts in this review on areas where impacts are

likely to occur.

- Site-specific stream habitat surveys. These surveys will be undertaken on reaches where impacts to stream habitat are suspected. Data collected will include longitudinal profiles, cross sections, bank stability, and available cover. Substrate characteristics within each reach will be evaluated through pebble counts. The locations for detailed surveys will be carefully selected to test specific hypothesis about the impacts of land-use activities, and will be the minimum number judged to provide adequate information for the watershed assessment.
- Surveys of potential fish migration barriers. Data will be collected at potential fish migration barriers to assess their impact on migrating fish. These analyses will include topographic site surveys and surveys of accessible habitat upstream of the barrier.

The aquatic habitat assessment will include:

- Analysis of aquatic habitat data collected between impacted and unimpacted reaches.
- Barrier analysis, including hydraulic conditions at different flows.
- Instream flow analysis. Using channel morphology data collected in the site-specific surveys, the potential impacts of diversion will be analyzed. This analysis will include hydraulic modeling of the effects of changes in flow regime.

Finally, the assessment will summarize opportunities for improving fish and aquatic habitat throughout the watershed. Specific improvement projects will be located, mapped and described. The feasibility, cost and anticipated benefits of potential projects will all be analyzed.

8.0 PRELIMINARY RIPARIAN/UPLAND VEGETATION & HABITAT REPORT

8.1 INTRODUCTION

An extensive literature search was conducted for vegetation resources for the Edgewood Creek watershed. The purpose of this review search was to determine the level of detail available from existing surveys and whether or not additional surveys will be required. The analysis relates to site conditions that could affect future restoration projects. All documents were made available through WRC.

Information required to determine vegetative restoration potential, constraints, and needs include:

- Occurrence of Threatened, Sensitive, and Endangered Species
- Dominant species along the active channel, floodplain, and elsewhere in the watershed
- An inventory of exotic and/or noxious weeds

- An evaluation of fire potential, and subsequent fire damage (erosion)
- Quantification of species with potential use in restoration (density, cover)
- Species vigor, condition, and age structure
- Quality and quantity of seed production (for species typically established by seed) within the watershed
- Evaluation of community structure as it relates to wildlife habitat
- Current and potential erosion, and restoration potential outside the channel and floodplain

The documents that were reviewed for this submittal include:

- Revegetation Headstart Program (TRPA 1994)
- United States Forest Service GIS Library
- Heavenly Valley Ski Resort Master Plan EIR/EIS Volume I (HBA 1995)
- Regional Plan for the Lake Tahoe Basin Heavenly Valley Master Plan Executive Summary Draft EIR/EIS. (HBA 1995)
- Heavenly Ski Resort Master Plan Volume 3B Draft EIR/EIS (HBA 1995)
- Heavenly Ski Resort Master Plan Volume 4B Draft EIR/EIS (HBA 1995)
- Biological Evaluation for the Heavenly Ski Resort Master Plan. (HBA 1995)
- Soil Survey Tahoe Basin Area California and Nevada (United State Department of Agriculture 1974)
- Effects of Erosion-Control Structures on Sediment and Nutrient Transport, Edgewood Creek Drainage, Lake Tahoe Basin, Nevada (U.S. Geological Survey 1988)
- The Tahoe Yellow Cress Annual Survey (TRPA 2001)
- Erosion Control and Water Quality in the Tahoe Basin California-Nevada, MS Thesis (John Paul Fenske August 1990)
- EIP Projects 880, 656

- Spotted Knapweed, Tall white top data base (UNR Cooperative Extension 2002)
- Nevada Natural Heritage Program (Nevada Department of Conservation and Natural Resources, 2002)

8.2 VEGETATION ISSUES

Vegetation issues for this project occur in five broad categories as they relate to potential restoration projects:

- Occurrence of Threatened, Sensitive, and Endangered Species (TES)
- Noxious weeds
- Upland and riparian community structure and health
- Background erosion and erosion potential in upland communities
- Encroachment by conifer in riparian corridor

8.2.1 TES

Table 8.2 lists TES species that have the potential to occur in the project area. Occurrence of these species within the watershed could affect the construction of restoration projects.

Table 8.2: Edgewood Watershed Potential Threatened, Endangered, and Sensitive Plant Species

Common Name	Scientific Name	Elevation (ft)	Habitat	Federal Status Forest Service/ F&WS/ Nevada Natural Heritage Program	CNPS and R-E-D Code
Tahoe Draba	<i>Draba asterophora</i> var. <i>asterophora</i>	10,000-11,000	Steep, rocky slopes, subalpine	Sensitive/No listing/Watch list	1B 3-1-2
Cuplake Draba	<i>Draba asterophora</i> var. <i>macrocarpa</i>	5,500-9,000	Rocky slopes and outcrops	Sensitive/No listing/No listing	1B 3-1-3
Torry's buckwheat	<i>Eriogonum umbellatum</i> var. <i>torryanum</i>	6,085-8,600	Meadows and seeps, and upper montane coniferous forest on volcanic, rocky substrate	No listing/ No listing/No listing	L1B –
Long-petaled Lewisia	<i>Lewisia pygmaea</i> ssp. <i>longipetala</i>	6,000-11,000	Shaded canyons and slopes	Sensitive/No listing/No listing	1B 3-1-3
Sierra Sedge	<i>Carex paucifructus</i>	6,500-8,300	Subalpine meadows Considered and rejected for the CNPS Inventory of rare and endangered plants: a synonym of <i>C. mariposana</i> , a common taxon	Sensitive/No listing/No listing	
Tahoe Yellow Cress	<i>Rorippa subumbellata</i>	6,000	Sandy shores of Lake Tahoe, wet depressions	Sensitive/ Species of Concern Critically Endangered in Nevada/Threatened	1B 3-3-2
Hidden-petaled Campion	<i>Silene invisa</i>	7,000-10,000	Red Fir and Lodgepole forests	No listing/No listing/ No listing	4 1-2-3
Washoe Tall Rockcress	<i>Arabis rectissima</i> var. <i>simulans</i>	6,035-7,350	Dry granite or andesitic soils., thinly littered open Jeffrey pine stands	No listing/no listing/sensitive	NA
Galena Creek Rockcress	<i>Arabis rigidissima</i> var. <i>demota</i>	7,400-9,600	Mixed Conifer and subalpine forest	No listing/ Species of Concern/Watch list	1B 1-1-3
<p>Forest Service Classification: Lake Tahoe Basin Management Unit Sensitive Plant Species List, Verified March 2000</p> <p>Fish and Wildlife Service Classification System System Revised 1996, Listing Verified March 2000:</p> <ul style="list-style-type: none"> • Endangered • Proposed Endangered • Threatened • Proposed Threatened • Candidate Species • Species of Concern <p>Nevada Natural Heritage Program</p> <ul style="list-style-type: none"> • Sensitive List • Watch List • Threatened 			<p>CNPS Classification:</p> <p>1B- Plants rare, threatened, or endangered in California or elsewhere. All plants constituting List 1B are eligible for state listing. It is mandatory that they be considered under CEQA.</p> <p>2- Plants rare, threatened, or endangered in California but more common elsewhere. All plants constituting List 2 and endangered for state listing. It is mandatory that they be considered under CEQA.</p> <p>4- Plants of limited distribution. Few plants constituting List 4 are eligible for state listing. It is mandatory that they be considered under CEQA.</p> <p><i>NPS R-E-D Code</i></p> <p>R-Rarity:</p> <ol style="list-style-type: none"> 1. Rare, but found in sufficient numbers and distribution that potential for extinction is low at this time. 2. Occurrence confined to several populations or to one extended population. 3. Occurrence limited to one or a few restricted populations, or present in small numbers. <p>E-Endangerment:</p> <ol style="list-style-type: none"> 1. Not Endangered 2. Endangered in a portion of its range 3. Endangered throughout its range <p>D-Distribution:</p> <ol style="list-style-type: none"> 1. More or less widespread outside of California 2. Rare outside California 3. Endemic to California 		

*This table was compiled from several existing sources and includes State of California species according to the California Department of Fish and Game Natural Diversity Data Base. Information from the Nevada Division of Wildlife Nevada, Natural Heritage Program (NNHP) is included in this report.

As part of the Heavenly Valley Master Plan, Threatened and Endangered Species surveys were conducted within the ski area. Potential habitat for these species was surveyed. All riparian areas were surveyed for *Silene invisa*, *Berberis*, and *Rorippa subumbellata*. East Peak Lake was surveyed for *Rorippa*. High elevation ‘balds’ were surveyed for the *Draba* species, and sandy, rocky, gravelly area for *Arabis rigidissima* var *demota*. *Draba asterophera* var *asterophera* was found at Monument Peak in 1992, and under lifts and runs at higher elevations. In 1997, mitigation efforts for plants located under a new lift at approximately 10,000’ were initiated by Parsons and Sycamore Environmental Consultants (Rob Brueck, Parsons, personal communication August 20, 2002). The mitigation consisted of transplants and direct seeding. The project has completed the 5th season of monitoring. Results have been mixed, as introductions were generally not successful but natural recruitment has resulted in replacement of impacted plants.

The Nevada Natural Heritage Program was also consulted. They have identified *Arabis rectissima* ssp *simulans* (Washoe tall rockcress) as a sensitive species with the potential to occur in the area.

The Tahoe Yellow Cress Annual Survey (TRPA 2001) was reviewed for presence of *Rorippa subumbellata* in the watershed. The survey conducted on September 5, 2001 counted 178 stems on Edgewood Beach. Surveys for this plant will continue to be conducted by TRPA staff and the Task Force.

No other known TES surveys have been conducted in the watershed.

8.2.2 Noxious Weeds

According to the data base provided by UNR cooperative extension, *Centaurea maculosa* (spotted knapweed) has not been located within the Edgewood project area to date. However, it has been located near the TRPA offices at Elk Point Road, as well as within the Glenbrook development (at two locations). In addition *Lepidium latifolium* (tall whitetop) has been located at six sites within the project area as well as elsewhere along the east shore (including Stateline) of Lake Tahoe. All of these white top populations were treated in July 2002 with the herbicide Telar.

No specific Noxious weeds surveys have been conducted in the Edgewood watershed to date.

8.2.3 Upland and Riparian Community Structure and Health

The Heavenly Valley Ski Resort Master Plan documents include some very comprehensive information within the boundaries of the resort. One hundred, seventy-four acres of Stream Environment Zones (SEZs) have been delineated. Potential jurisdictional wetlands have been identified but delineations have not been conducted. Waters of the United States have not been delineated or field verified. Plant ‘associations’ have been designated, but the source of the

classification system was not referenced. The documents do not discuss community health, age classes, reproductive potential, or other aspects of vegetation critical to designing restoration projects.

The United States Forest Service GIS Library has comprehensively mapped a number of plant communities basin-wide including the Edgewood watershed. These include old growth forest, wet meadow, riparian areas, montane meadow and endangered species. These communities were mapped from aerial photos, and the size of the communities has been quantified. However, specific details regarding community structure, species composition, diversity, vigor etc. have not been documented as part of this analysis.

Old growth forest management needs to be considered for wildlife habitat and erosion potential. Close coordination with the Lake Tahoe Basin Management Unit (LTBMU) will be necessary.

EIP Projects 880 and 656 has identified overstory vegetation and evaluated bank conditions along several reaches of Edgewood Creek.

8.2.4 Background Erosion and Erosion Potential

Project Head Start provides general guidelines for erosion control and revegetation in the Lake Tahoe Basin. Eighteen sites (cut and fill slopes) were identified for erosion control projects along SR 207 (Kingsbury Grade). No specific recommendations have been made for these slopes.

According to the Tahoe Basin Area California and Nevada Soil Survey, Edgewood Creek passes through six series: 1. Ev, Elmira loamy coarse sand wet variant, 2. JeD, Jabu coarse sandy loam shallow variant, 3. CaD, Cagwin-Rock outcrop 5-15% slope, 4. CaE, Cagwin-Rock outcrop 15-30% slopes, 5. CaF, Cagwin-Rock outcrop 30-50% slopes, and 6. RcF, Rock outcrop-Cagwin complex 30-50% slopes. The soils are generally coarse, and parts of the drainage are quite steep, indicating a high potential for erosion.

High erosion potential within the drainage is supported by the report entitled 'Effects of Erosion-Control Structures on Sediment and Nutrient Transport, Edgewood Creek Drainage, Lake Tahoe Basin, Nevada 1981-1983'. The report presents water quality data from erosion and sediment control projects built in 1982, within the Edgewood Creek drainage, due to high rates of sedimentation along SR 207. The results 'suggested that the erosion-control structures were effective in reducing sediment concentrations'. There was no additional evaluation of performance of the Best Management Practices (BMPs), and erosion control specifications were not referenced. For example, there is no information available regarding use of vegetation.

A number of erosion control projects in the watershed have been recently completed, are in the process of completion, or are still in the design phase. These include the Stateline Erosion Control Project (Ernest Jones, 1989), Kingsbury Estates/Tahoe Village Erosion Control Project (JWA and Associates, completed in 1999 and monitored for two years), Kingsbury Village (JWA, under construction), Douglas County Dump Site, and Lower Kingsbury Basin. Another project is currently being designed by Resource Concepts Inc.

An extensive report was produced in 2000 summarizing the results of the 1999 survey of the Kingsbury Erosion Control Project. Although surveyed in 2000, a report was not produced since the survey was unsolicited. A rough copy of the report is available through either JWA's office, or through Washoe County (the report also include an assessment of the Incline One Erosion Control Project) and at WRC. The following is a summary of findings:

There was little evidence of the cover crop and almost no establishment by *Elymus elymoides* (squirreltail). These species should be considered on a site-to-site basis. Squirreltail frequently contains some *Bromus tectorum* (cheatgrass) seed and can introduce this plant to an otherwise un-occupied site. However, cheatgrass was not a problem of this project. There also was no establishment of Jeffrey pines from seed, and its use should be discontinued in mixes. Tina and the S. Benjamin/Jack Basin showed serious disturbance and re-treatment of these areas was of questionable value. The Tina site, where compost was applied, showed almost no vegetation establishment. Use of composts in decomposed granite to restore organic matter needs to be carefully evaluated for scientific merit, since many native plants thrive in low nutrient (e.g. nitrogen) regimes. Little erosion was noted throughout the rest of the project, and the drainage improvements examined required no maintenance. The Bonded Fiber Marix on Linda Way was still in place after two years, even on an almost vertical slope. Although vegetative cover was not high, numerous grass and shrub seedlings were observed here as well as elsewhere throughout the project area. This is viewed as being successful since the colonizing native shrub community was the target plant community, and most appropriate for the site. Excellent shrub establishment and good cover occurred behind curb where there were A/C or concrete dikes. Vehicles continue to cause disturbance over rolled concrete curbs. Particularly successful from seed were rabbitbrush and sagebrush. Of the grasses, *Poa ampla* (big bluegrass, a cultivar and synonym for *Poa secunda*) was most successful.

The specifications were not in compliance with the Nevada Bond Act Guidelines since the seed mix consisted of non-locally collected seed. Only the Jeffrey pine seeds complied with the Guidelines (Placerville source). The Guidelines were not in place when the initial specifications were developed. However, with on-going problems with availability of local seed, it would have been unlikely to obtain local collections for this project. Although the Guidelines do not require that Performance Standards be included in the specifications, this is highly recommended. Performance Standards can be critical to project success.

For future projects in decomposed granite, use of mycorrhizal inocula is recommended to assist with the establishment of both grasses and shrubs. Since nitrogen is typically not the limiting factor for growth in perennial plants adapted to low nitrogen regimes, and nutrient cycling by microbial populations is critical, inoculation of the soil along with application of a food source should be beneficial. Based on this recommendation, inocula is being used on the Kingsbury Village Revegetation Project currently under construction.

8.3 PHASE II DATA COLLECTION

Phase II will include collection of the following data. Note that the surveys will take place at a sup-optimum time for species identification. :

- Evaluation of Threatened, Endangered and Sensitive Plants potential habitat
- Evaluation of Noxious Weed habitat
- Spot field verify location and extent of old growth forest
- Evaluation of riparian vegetation including:
 - extent of habitat
 - composition of dominant species
 - evaluation of community health
 - evaluation of reproductive
 - evaluation and quantification of resources suitable for restoration
- Evaluation of conifer encroachment of riparian areas

8.4 REFERENCES

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9.0 PRELIMINARY TERRESTRIAL WILDLIFE REPORT

9.1 INTRODUCTION

The purpose of the Tech Memo I is to provide a review of terrestrial wildlife conditions for the Edgewood Creek watershed using existing reports and resources. No site visits were made to the project area. The wildlife conditions in the Edgewood Creek watershed were assessed through a review of the following documents: Biological Evaluation for the Heavenly Valley Ski Resort Master Plan (HBA 1995); Lake Tahoe Watershed Assessment (USDA 2000); Tahoe Regional Planning Agency Environmental Plan Stream Assessment for Edgewood Creek (2001); Sierra Nevada Forest Plan Amendment and Record of Decision (USDA 2001); Riparian Biological Diversity in the Lake Tahoe Basin (Manly and Schlesinger 2001); Birds of the Lake Tahoe Region (Orr and Moffitt 1971); and Mammals of Lake Tahoe (Orr 1949).

In addition, occurrence records for sensitive species compiled by the U.S. Forest Service (USFS) Lake Tahoe Basin Management Unit (LTBMU); and species-specific habitat mapped by the LTBMU (e.g., arc view files), Tahoe Regional Planning Agency (TRPA), and the Nevada Department of Wildlife (NDOW) were reviewed.

Additional documents that could provide information on terrestrial wildlife, but are not currently available are cited in Section III of this memo.

9.2 SIERRA NEVADA FRAMEWORK

The Sierra Nevada Forest Plan Amendment (SNFPA) (USDA 2000) and Record of Decision (ROD) (USDA 2001) were used by the LTBMU to delineate land allocations for special status wildlife species. The management direction provided in these documents affects special status wildlife species that might occur in the Edgewood Creek watershed. The SNFPA and ROD amend management direction in national forest land management plans and regional guides, including the Lake Tahoe Basin Management Unit Land and Resource Management Plan (1988), in order to address the following five problem areas:

- sustain old forest ecosystems
- protect and restore aquatic, riparian, and meadow ecosystems
- improve fire and fuels management
- combat noxious weeds
- sustain lower westside hardwood ecosystems.

The SNFPA provides the following direction:

- specific guidelines and objectives for management direction and goals
- desired future conditions expected over the next 50 to 100 years

- standards and guidelines to be used in designing and implementing future management actions
- strategy for inventory, monitoring, and research to measure progress toward attainment of desired conditions and to make adjustments in management where needed (adaptive management).

The SNFPA and ROD will guide activity-level decision making in the LTBMU until they are replaced through subsequent amendment or revision. Where there is overlap between the 1988 LTBMU Land and Resource Management Plan and the SNFPA and ROD, the latter two supplant the LRMP.

The SNFPA and ROD provide management strategies and standards and guidelines that affect threatened, endangered, proposed, and sensitive (TEPS) wildlife species that might occur in the Edgewood Creek project area. The management strategies are linked to the SNFPAs network of land allocations and the standards and guideline for management in these allocations.

9.2.1 Land Allocation Standards and Guidelines

Broad-scale land allocations, such as *old forest emphasis areas* appear on the map included with the SNFPAs Final Environmental Impact Statement. Such allocations are designated as “mapped.” Smaller-scale land allocations, such as *California spotted owl protected activity centers* (PACs) are not shown on the map as they will be delineated by each forest. Such allocations are referred to as “unmapped.” Each land allocation has a set of standards and guidelines that determine how management is to proceed within the allocation.

Certain land allocations overlap with one another. Management direction for higher priority allocations preempts management direction for lower priority allocations. In general, land allocations that have more restrictive management direction preempt those with less restrictive direction. Mapped land allocations with more restrictive standards and guidelines supplant other mapped allocations that are lower in order of priority. Unmapped land allocations with standards and guidelines that protect special habitats or species are placed higher in the priority ordering, while land allocations that call for more active management are placed lower in the ordering.

Mapped Allocations

Old forest emphasis areas are larger landscapes that contain the majority of existing old forest stands and they are managed to develop larger aggregations of old forest over time. Management in old forest emphasis areas emphasizes reducing hazardous fuel conditions and re-introducing fire. Prescribed fire is emphasized to reduce fuels and meet ecological goals in old forest emphasis areas. Areas of high fire hazard and risk have highest priority for prescribed fire treatments.

The general forest is comprised of national forest lands that lie outside wilderness areas, wild and scenic rivers, PACs, den sites, old forest emphasis areas, California spotted owl home range core areas, and the urban wildland intermix zone. Management direction is to: (1) reduce hazardous fuels to effectively modify wildland fire behavior to reduce uncharacteristically severe wildland

fire effects; and (2) to increase the numbers of large trees and the distribution and connectivity of old forests across landscapes.

The urban wildland intermix zone is an area where human habitation is mixed with areas of flammable vegetation. It is comprised of two zones: an inner ¼ mile wide buffer, called the defense zone, and an outer 1 ¼ mile wide buffer, called the threat zone. Urban wildland intermix zones have highest priority for fuels treatment. Fuels in the inner defense zone are more intensively treated to prevent loss of life and property. The management directions for this land allocation are designed to attain the management objective, which is to enhance fire suppression capabilities by modifying fire behavior inside the zone and providing a safe and effective area for possible future fire suppression activities.

Unmapped Allocations

Protected activity centers (PACs) are unmapped land allocations for the California spotted owl, northern goshawk, great gray owl, and den sites for marten.

- California spotted owl nest and roost sites: 300 acres of the best available habitat surrounding each owl activity center detected since 1986, arranged in as compact a unit as possible. Activity centers are based on documented nest sites, most recently known roost sites, or a central point based on repeated daytime detections.
- Northern goshawk breeding sites: 200 acres of the best available forested habitat surrounding nest sites (or, if the nest cannot be located, the location of territorial adults or recently fledged juveniles during the fledgling dependency period) in the largest contiguous blocks possible.
- Great gray owl nest sites: 50 acres of the best available forested habitat plus adjacent meadow habitat surrounding nest sites.
- Marten den sites: 100 acres of the highest quality habitat surrounding den sites, arranged in as compact a unit as possible.

Limited operating periods (LOPs) are applied to PACs and den sites during nesting and denning seasons to protect breeding adults and their offspring as follows:

- California spotted owl: within ¼ mile of nest site March 1 through August 31 unless surveys confirm that California spotted owls are not nesting.
- Northern goshawk: within ¼ mile of nest site February 15 through September 15, unless surveys confirm that northern goshawks are not nesting. (It should be noted that the Tahoe Regional Planning Agency (TRPA) requires a ½ mile buffer around nests.)
- Great gray owl nest sites: within ¼ mile of active great gray owl nest stands during March 1 through August 15.

- Marten den sites: May 1 through July 31.

The Limited Operating Periods for special status wildlife species provide potential time constraints on future Environmental Improvement Projects (EIP) in the watershed. The LOPs would be implemented if any of the special status wildlife species are determined to be nesting or denning within the vicinity of the project area. Although not cited in the Framework (USDA 2001), no disturbance buffer zones of several hundred feet have been implemented by the California Department of Fish and Game (CDFG) for any activities that could potentially impact nesting willow flycatchers. Information on any buffer zones implemented by NDOW for nesting willow flycatchers is currently being compiled. The TRPA does not currently have limited operating periods or buffer zones for willow flycatchers, but would defer to existing management schemes (Romsos, personal communication).

California spotted owl home range core areas surround and include the 300-acre PAC. Home range core area sizes vary by national forest, for the LTBMU, it is 1,000 acres. Management objectives for California spotted owl home range core areas are identical to those for *old forest emphasis areas*. This direction applies to California spotted owl home range core areas except where home range core areas overlap with urban wildland intermix zone.

The standards and guidelines for conserving willow flycatcher are based on: (1) the 82 known willow flycatcher sites in the Sierra Nevada national forests; (2) occupied willow flycatcher habitat; and (3) emphasis habitat. The activity-related standards and guidelines for this land allocation include assessing impacts of livestock grazing and surveys of willow flycatcher habitat.

9.3 UNMAPPED LAND ALLOCATIONS IN THE EDGEWOOD CREEK WATERSHED

In accordance with the Sierra Nevada Forest Plan Amendment (USDA 2001), the United States Forest Service (USFS) Lake Tahoe Basin Management Unit (LTBMU) delineated unmapped land allocations for the wildlife species of concern. These delineations are based on records of occurrences and on areas with potentially suitable habitat characteristics. Because the following species are not known to occur in the project area and/or suitable habitat is not present, no PACs are delineated for the following species: spotted owls and great gray owls. Within the project area, unmapped land allocations have been delineated for willow flycatchers.

The standards and guidelines for conserving willow flycatcher are based, in part, on emphasis habitat, which is defined as meadows larger than 15 acres that have standing water on June 1 and a deciduous shrub component. Within the Edgewood Creek watershed, the LTBMU has delineated approximately 0.7 miles of suitable habitat and approximately 2.2 miles of emphasis habitat for the willow flycatcher. No occupied habitat or willow flycatcher territories area mapped.

No northern goshawk PACs are delineated in the Edgewood Creek watershed. The closest goshawk PAC is delineated approximately ¼ mile north of the project area. According to the LTBMU wildlife records, no northern goshawks have been recorded in the Edgewood Creek watershed. However, TRPA and NDOW report that a goshawk was detected in one of the

tributaries to Edgewood Creek. The goshawk was detected during protocol surveys conducted for nesting goshawks in late June by a private contractor for the proposed North Canyon Bike Trail Project. Prior to conducting the second survey, the Gondola Fire burned the area in which the bird was detected. No nest was found and it is unknown whether the bird was paired or a territorial single.

The USFS recorded a single marten detection in the upper headwaters of the Edgewood Creek watershed. No den site is mapped for this detection. Multiple observations of martens were recorded during protocol forest carnivore surveys conducted for Heavenly Valley Ski Resort's Master Plan. This project encompasses a portion of the upper reaches of Edgewood Creek. No den sites were found in the surveys and thus, no den sites were delineated. The habitat where the observations were recorded was atypical (i.e., interstitial forest stands), and the study's authors cite several reasons for these findings that would require further research.

9.4 OTHER MAPPED WILDLIFE HABITAT

Other wildlife habitat is mapped in the Edgewood Creek watershed that is not based on the Framework (USDA 2001) and includes habitat mapped by the TRPA and NDOW for the following species: mesocarnivores, mule deer, and waterfowl.

Potential mesocarnivore (e.g., pine martens) habitat was mapped based on ranking potential habitat in 10% increments using remotely sensed vegetation and the California Wildlife Habitat Relationships (CWHR). The higher the ranking the more likely the area is to provide suitable habitat. According to this ranking, the habitat value for mesocarnivores increases as one traverses south of Edgewood Creek and increases in elevation. Nonetheless, the highest ranking is only 51-61%.

Mapped summer range for the Carson Deer Herd is delineated in the upper 1/3 of the Edgewood Creek watershed. No mapped critical summer or critical fawning range occurs within the watershed.

A total of 18 sites within the Lake Tahoe Basin are designated as mapped waterfowl habitat by TRPA. Mapped waterfowl habitat in the Edgewood Creek watershed extends from the mouth of Lake Tahoe to Highway 50 and encompasses Edgewood Tahoe Golf Course. The TRPA has been collecting data on avian species richness and diversity for these 18 sites since 1999. According to TRPA (Romsos, personal communication), the mapped habitat for Edgewood Creek is ranked 12th out of the 18 sites in terms of species richness and diversity (i.e., ranked in the lower quartile).

9.5 SPECIAL STATUS SPECIES NOT MAPPED

Mapped habitat for the following species or categories is not recorded in or near the Edgewood Creek Watershed: amphibian detections, peregrine falcon threshold, golden eagle threshold, osprey threshold, osprey nests, bald eagle nests, bald eagle management zone and winter habitat, California spotted owl nests or detections, California spotted owl nests, PACs, or HRCA.

Although the USFS does not record amphibians (e.g., arc view files), the TRPA Environmental

Improvement Plan stream assessment for Edgewood Creek (2001) does note the presence of pacific tree frog larvae and adults in the upper reach of Edgewood Creek located within Heavenly Valley Ski Resort.

9.6 TAHOE REGIONAL PLANNING AGENCY GUIDELINES AND REGULATIONS

The following is an overview of the TRPA guidelines and regulations that affect management of wildlife resources in the Lake Tahoe Basin.

9.6.1 *Environmental Thresholds*

Within the Lake Tahoe Basin, the Tahoe Regional Planning Agency (TRPA) has developed goals, policies, thresholds and ordinances pertaining to wildlife. TRPA has established Environmental Thresholds (TRPA Resolution 82-11) for wildlife that address special interest species, habitats of special significance, stream habitats, and instream flows. These Environmental Thresholds are used to establish the significance of an environmental effect to wildlife resources in the Lake Tahoe Basin. (The thresholds are being re-evaluated and modified, however they are not scheduled for release until 2007 (Romsos, personal communication).)

9.6.2 *Habitats of Special Significance*

The Thresholds establish a non-degradation management standard for significant wildlife habitat consisting of deciduous trees, wetlands, and meadows, while providing for opportunities to increase the acreage of such riparian associations.

9.6.3 *Stream Habitat*

Maintain the 75 miles of excellent, 105 miles of good, and 38 miles of marginal stream habitat as indicated by the map on page 76 of the Environmental Impact Study prepared for the Environmental Thresholds Study.

9.6.4 *Instream Flows*

Until instream flow standards are established in the Regional Plan to protect fishery values, a non-degradation standard shall apply to instream flows.

9.6.5 *Special Interest Species*

The TRPA has designated six species and one category of species as species of special interest because of rarity or other public interest. The Thresholds provide a minimum number of population sites and designates disturbance zones for the species identified in Table 9.6.

Table 9.6: TRPA Environmental Thresholds for Special Interest Species.

Species of Interest	Population Sites	Disturbance Zone	Influence Zone
Goshawk	2	0.50	3.50
Osprey	4	0.25	0.60
Bald Eagle (winter)	2	Mapped Areas	Mapped Areas
Bald Eagle (nesting)	1	0.50	Variable
Golden eagle	4	0.25	9.0
Waterfowl	18	Mapped Areas	Mapped Areas
Deer	-	Meadows	Mapped Areas
Peregrine Falcon	2	0.25	7.6

9.6.6 Goals and Policies

The TRPA Goals and Policies provide for maintenance of suitable wildlife habitats for all game and non-game indigenous species by maintaining and increasing habitat diversity. Habitats essential for threatened, endangered, or sensitive (TES) wildlife species must be preserved and enhanced. The Goals and Policies also reinforce the provisions of state and federal protection for TES wildlife species.

Aquatic habitats essential for growth, reproduction, and perpetuation of the fishery resource shall be improved by prohibiting actions that will degrade the resource and encourage actions to enhance it. Stream habitat is protected from physical alteration, such as artificial modification to stream channels, unless TRPA finds that such actions avoid significant adverse impacts to the fishery or are otherwise allowed under the Code.

Development proposals affecting streams, lakes and adjacent lands must evaluate impacts to the fishery. No project or activity shall be undertaken within the boundaries of a stream environment zone except as otherwise permitted for habitat improvement, dispersed recreation, vegetation management, or as provided in Chapter 20 (TRPA 1991).

Stream environment zones adjoining creeks and major drainages that link islands of habitat and shall be managed, in part, for use by wildlife as movement corridors. Structures proposed within these movement corridors shall be designed so they do not impede the movement of wildlife. Riparian vegetation shall be protected and managed for wildlife.

Conservation Element – Wildlife

Goal #1: Maintain suitable habitats for all indigenous species of wildlife without preference to game or non-game species through maintenance of habitat diversity.

Policies

1. All proposed actions shall consider impacts to wildlife.
2. Riparian vegetation shall be protected and managed for wildlife.

Goal #2: Preserve, enhance and where feasible, expand habitats essential for threatened, endangered, rare, or sensitive species found in the Basin.

Policies

1. Endangered, threatened, rare, and special interest species shall be protected and buffered against conflicting land uses.

Policies:

1. Endangered, threatened, rare, and special interest species shall be protected and buffered against conflicting land use.

Conservation Element - Fisheries

Goal #1: Improve aquatic habitat essential for the growth, reproduction, and perpetuation of existing and threatened fish resources in the Lake Tahoe Basin.

Policies

1. Development proposals affecting streams, lakes and adjacent lands shall evaluate impacts to the fishery.

Code of Ordinances

The Code of Ordinances establishes standards for wildlife and fisheries resources. They require identification of potential impacts, such as habitat alteration, establish protection mechanisms, and require mitigation measures when necessary.

According to TRPA's Code of Ordinances Section 78.3, special interest species shall be protected from habitat disturbance due to conflicting land use.

78.2.A Stream Environment Zones: No project or activity shall be undertaken within the boundaries of a SEZ except as otherwise permitted for habitat improvement, dispersed recreation, vegetation management, or as provided in Chapter 20 (TRPA 1991).

78.2.B Movement and Migration Corridors: Movement and migration corridors shall be protected as follows:

(1) Stream environment zones adjoining creeks and major drainages that link islands of habitat and shall be managed, in part, for use by wildlife as movement corridors. Structures, such as bridges, proposed within these movement corridors shall be designed so as not to impede the movement of wildlife.

(2) Projects and activities in the vicinity of deer migration areas shall be required to mitigate or avoid significant adverse impacts. The location of deer migration areas shall be verified by the appropriate state wildlife or fish and game agencies.

78.2.C Critical Habitat: Any element of the overall habitat for any species of concern, which, if diminished, could reduce the existing population or impair the stability or viability of the

population, shall be considered critical habitat. This shall apply also to habitat for special interest species indigenous to the region whose breeding populations have been extirpated but could return or be reintroduced.

- (1) No project or activity shall cause, or threaten to cause, the loss of any habitat component considered critical to the survival of a particular species.
- (2) No project activity shall threatened, damage, or destroy nesting habitat of raptors and waterfowl or fawning habitat of deer.
- (3) Wetlands shall be preserved and managed for their ecological significance, including their value as nursery habitat to fishes, nesting and resting sites for waterfowl, and as a source of stream recharge, except as permitted pursuant to Chapter 20 (TRPA 1991).

78.2.D Snags: Snags shall be protected and preserved as follows:

- (1) Standing dead trees with diameters 11 inches (dbh) or greater, and more than 20 feet tall, shall not be removed except as provided in Section 71.4 or when densities of snags in the immediate area exceed two per acre.
- (2) Provisions for the protection of snags suitable for wildlife habitat shall be incorporated into all tree harvest plans and projects as conditions of approval, when applicable.
- (3) Where appropriate, cull logs may be left for wildlife.

78.3.A Disturbance Zones: Perching sites and nesting trees of goshawks, peregrines, eagles, and osprey as shown on the TRPA Regional Plan Overlay Maps shall not be physically disturbed in any manner nor shall the habitat in the disturbance zone be manipulated in any manner unless such manipulation is necessary to enhance the quality of the habitat.

- (1) The disturbance zones for goshawks are 0.5 miles in diameter.

78.3.B Adverse Impacts: Users, projects or activities, outside existing urban areas and within the disturbance zone of special interest, threatened, endangered or rare species, shall not, directly or indirectly, significantly adversely affect the habitat or cause the displacement or extirpation of the population.

79.2.B Stream Habitat: Stream habitat shall be protected as follows:

- (1) Artificial modification to stream channels, or other projects, activities or uses in stream environment zones that may physically alter the natural characteristics of the stream, shall not be permitted unless TRPA finds that such actions avoid significant adverse impacts to the fishery or are otherwise allowed under the Code.

- (2) All stream crossings shall be constructed so as to allow unrestricted upstream and downstream movement of fishes.

9.7 NEVADA DIVISION OF WILDLIFE

Information on NDOW guidelines and regulations is currently being compiled and will be incorporated into the subsequent technical memo. The Nevada Department of Wildlife (NDOW) exercises authority to implement and enforce statutes that affect wildlife, particularly those that involve sensitive species. Through a cooperative agreement with the United States Fish and Wildlife Service (USFWS), NDOW is responsible for sensitive species identified by the federal Endangered Species Act (ESA).

9.8 PHASE II

Phase II will include evaluation of data and additional data collection. Additional documents that could provide relevant information on terrestrial wildlife, but are not currently available include studies, reports, plans, and projects associated with Edgewood Golf Course and TRPA bird/wildlife studies in the project vicinity; timber projects conducted within the past ten years for the Park Cattle Company and Heavenly Valley Ski Resort; and other environmental documents prepared for projects in the vicinity of the Edgewood Creek watershed. Such documents might provide information on the affected environment prior to a proposed action and provide an assessment of the project's effects on wildlife, and typically will include information on species occurrences. Historic aerial photographs of the Edgewood Creek watershed will be reviewed in order to assess changes in the distribution and quantity of riparian vegetation and how this would have affected wildlife.

Phase II will include field surveys to verify habitat delineations and to assess the presence/absence of vertebrate terrestrial species. Remote sensing for vegetation must typically be ground-truthed for accuracy. Field surveys will also provide an opportunity to assess potential historic occurrences of wildlife. The location of various habitat types (e.g., potential amphibian habitat) and unique species occurrences (e.g., mountain beaver) will be recorded with a hand-held GPS unit. Existing information on species recorded in the watershed will be compiled and mapped for inclusion in the next tech memo. For example, long-toed salamander larvae have been documented in the Edgewood Golf Course ponds (Romsos, personal communication).

The following tasks require additional coordination with the LTBMU:

- The methods used to delineate habitat mapped for special status species and when the maps were last updated
- a schedule of any willow flycatcher surveys for the Edgewood Creek watershed
- a schedule of any surveys for northern goshawks and spotted owls
- occurrence data for USFS management indicator species such as blue grouse and pileated woodpeckers

- develop maps of habitat suitability for special status species that potentially occur in the Edgewood Creek watershed for which habitat maps have not been previously compiled. This will require a review GIS timber strata maps (e.g., forest timber type, timber size, and timber density) to delineate potentially suitable habitat in the Edgewood Creek watershed for special status species including the northern goshawk and spotted owl. For example, the 9 August 2000 northern goshawk survey protocol outlines the method to delineate suitable. The protocol states that a model of suitable (likely to be occupied) habitat should be developed using parameters such as forest structure, patch size, and topographic and hydrologic features. Goshawks use nest sites with greater canopy cover, greater basal area, greater numbers of large diameter trees, and lower shrub/sapling/understory cover and numbers of small diameter trees, and gentle to moderate slopes relative to non-used, random sites. High canopy cover is the most consistent structural feature similar across studies of northern goshawk nesting habitat (Sierra Nevada Forest Plan Amendment (USDA Jan 2001).

Coordination with other team members and agency personnel will occur to address the following questions:

- What is the extent of aspen stands in the watershed? Are aspen stands becoming more or less numerous? Are the stands decadent? What are the factors affecting stand succession and regeneration? What wildlife species occur in the aspen stands based on direct observation, observation of wildlife sign, and probable historic conditions? What are the present and potential human disturbances to this habitat?
- What is the condition of Edgewood Creek in terms of providing amphibian habitat? Are current conditions optimal?
- What are the conditions of the watershed's forest stands? Delineate and assess previous harvest activities that have occurred within the past ten years. What is the distribution of forest types (e.g., old-growth) and what types of wildlife are expected to occur in these habitats?
- What is the condition and extent of the riparian habitat, including riparian transition zone habitat? What is the value of this habitat to wildlife species known to occur and potentially occurring in the watershed? What are the present and potential human disturbances to this habitat?
- Identify key wildlife species that can be used to evaluate the watershed. Provide information on potentially occurring focal terrestrial vertebrate species as per the categories described in the Lake Tahoe Watershed Assessment (2000).
- What are the current and proposed management activities that could affect habitat suitability for special status and general wildlife species in the watershed? For example, is management direction geared toward development of late seral stage forest conditions?

- What are the current and probable historic wildlife conditions of the upper reach of the watershed?
- What are the current and probable historic wildlife conditions of the watershed from the mouth of Lake Tahoe to Highway 50, which encompasses the Edgewood Golf Course? Did the historic habitat associated with this segment provide habitat for willow flycatchers (i.e., meadow with high water table, with standing water and riparian shrubs, specifically willows)? What were the likely vertebrate species associated with this portion of the watershed?
- What are the potential impacts to terrestrial wildlife, including bats, invertebrates, and other classes from conifer invasion in the near-stream zone?

9.9 REFERENCES CITED

Manley, P.N. and M.D. Schlesinger. April 2001. Riparian Biological Diversity in the Lake Tahoe Basin. A final report for the California Tahoe Conservancy and the U.S. Forest Service Riparian Grant #CTA-3024.

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Orr, R.T. 1949. Mammals of Lake Tahoe. California Academy of Sciences. San Francisco, Ca.

Romsos, Shane. Personal communication. Wildlife and Fisheries Program Manager, Tahoe Regional Planning Agency.

Tahoe Regional Planning Agency (TRPA) 1991. Evaluation Threshold Carrying Capacities and the Regional Plan Package. November 4, 1991.

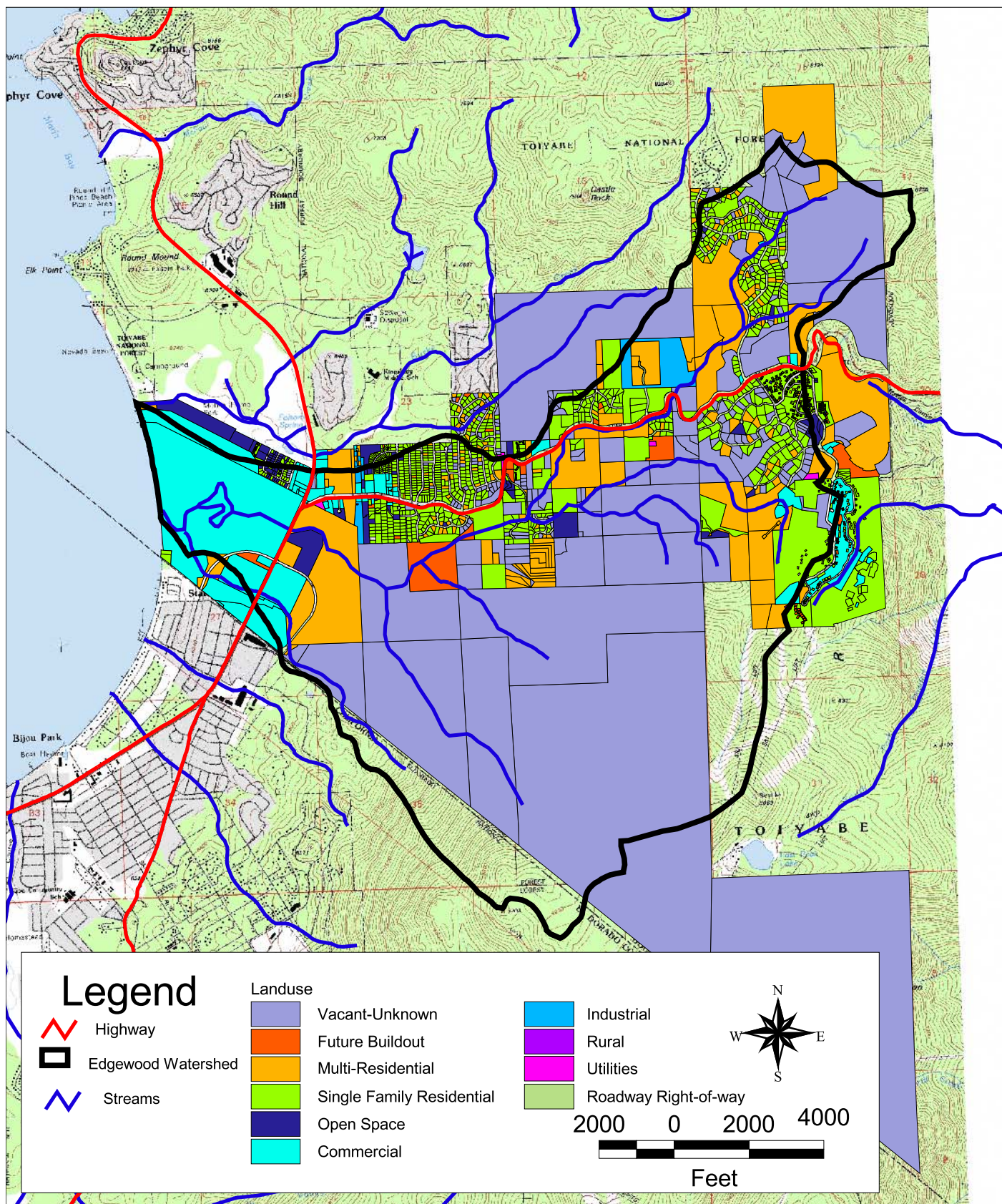
10.0 PRELIMINARY LAND USE REPORT

The land use of the watershed, delineated in Figure 10.1, is based on the Douglas County parcel map, depicting each parcel with its Douglas' County's assigned land use. The watershed consists of approximately 63% vacant with unknown use (including the Heavenly Ski Area and state and federal land), 14% dedicated open space, 12% single family residential, 8% commercial (including the Edgewood Golf Course), 1% future build out area, and 1% industrial. The Edgewood Golf Course, Heavenly Ski area and many of the residential developments within the watershed are adjacent to Edgewood Creek or its tributaries.

Figure 10.2 depicts the slopes within the watershed, as computed by TRPA from a 10- meter DEM. Looking at the slope and land use coverages as well as the soils, it is evident that much of the infrastructure and roads within the watershed have been constructed on steep land underlain with highly erodible soils. This has contributed to increased erosion within the watershed and an increased sediment supply to the creek.

Additional data collection regarding land use is not necessary. However, the team may want

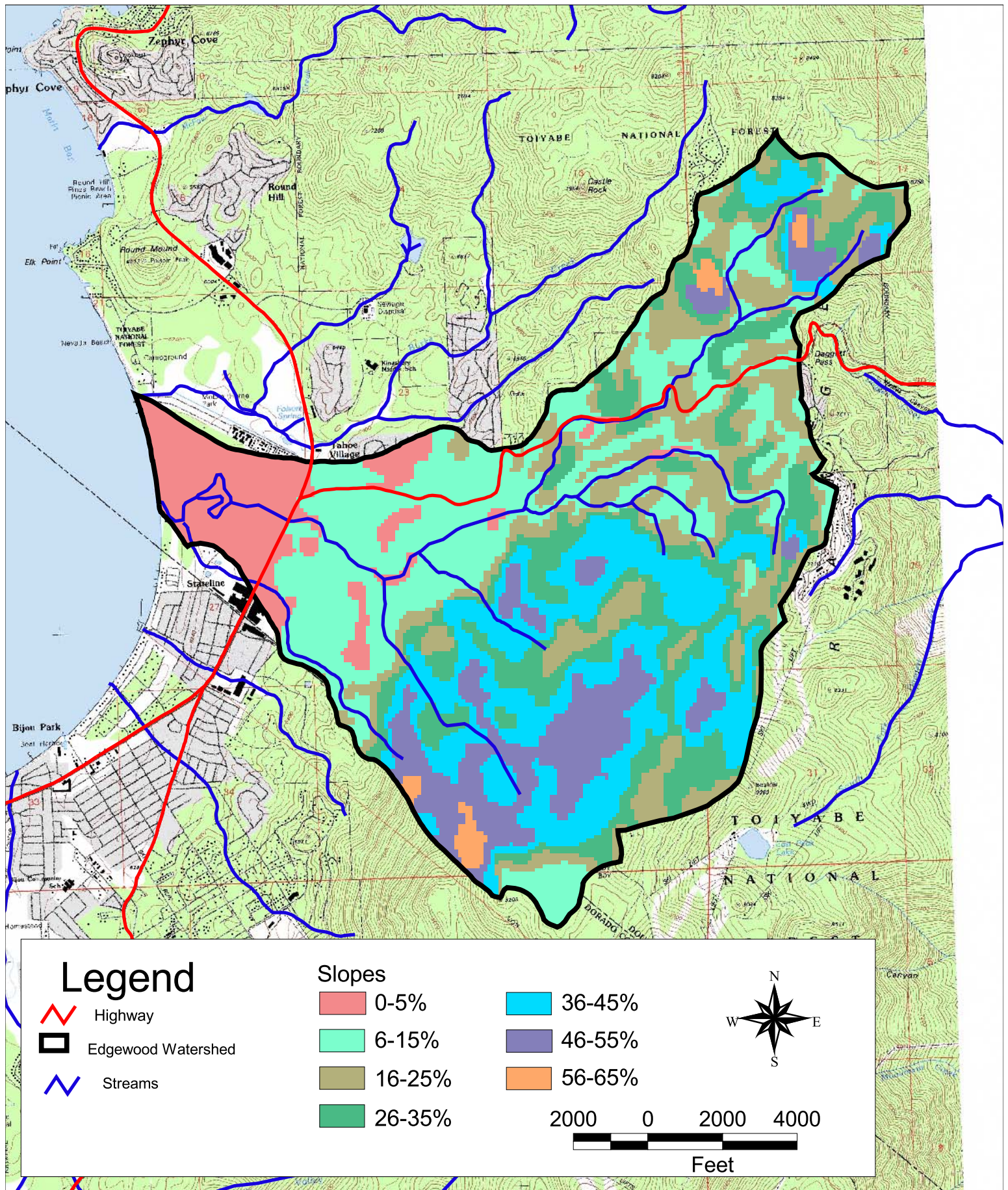
further specification of federal and state land and its present and future use. This can be compared with existing data. In Phase II, field data collection will be completed on the roadways within the watershed, determining which are paved and which are dirt, relating this to erosion control improvements and the drainage system.



Edgewood Creek
Integrated Watershed
Assessment Team

Edgewood Creek
Land Use Map

Figure
10.1



11.0 PRELIMINARY STAKEHOLDERS LIST

11.1 INTRODUCTION

An initial public participation and stakeholders meeting is imperative to the acceptance of the conclusions of the watershed assessment and the Watershed Project Strategy Report. Identifying stakeholders is a critical step in the process. The team used APN# from Douglas County to generate a landholders list. Additional potential stakeholders consist of business in the vicinity, recreational or tourism related business and recreational groups in the Lake Tahoe area. Organizations interested in the health and well being of the lake and the watershed are also in the list of potential stakeholders. State agencies, federal agencies and quasi-municipal agencies, like improvement districts, within the watershed or adjacent to it are also potential stakeholders. Private parties with potential interest in the watershed including casinos, golf courses and other business that may or may not be affected by the watershed assessment, but may have a direct or indirect economic interest in it are also included in the stakeholders list.

Appendix A contains the list of individual, agencies and private parties that have already been contacted by the watershed assessment team via mail. Public notice announcements were published in the Nevada Appeal, Tahoe Daily Tribune, North Lake Tahoe Bonanza, Record-Courier and the Reno Gazette-Journal. A copy of the announcement is included in Appendix A. On or about August 21, 2002, the team will develop a list of stakeholders that are critical to the public participation process and contact them via phone to remind and invite them to the initial public participation meeting.

11.2 MECHANICS OF PUBLIC PARTICIPATION

The watershed assessment team intends to use the principals of *Systematic Development of Informed Consent (SDIC)* for the public participation. The primary principal of SDIC is that information distribution and inclusion of the potentially affected parties must occur at the very inception of the project (in this case the watershed assessment). This also implies that the stakeholder contacting procedure must be able to stand up to a future potential legal challenge. These challenges are usually in the form of inadequate effort in contacting a potential stakeholder. For this reason the assessment team included many persons and agencies in the mail list that may be questionable stakeholders and advertised the legal notice in newspapers that may not directly reach a potential stakeholder, but may reach other interested parties. Potential legal challenges can also be from inadequate follow-through of the initial meeting. It is therefore imperative that adequate meeting minutes with clearly defined conclusions and task assignment is generated and mailed to all attendees. In many cases a follow-up public notice is published in the newspapers informing interested non-attendees that the minutes of the meeting are available. The initial public participation meeting will be set up to encourage a free flow of ideas and information. It is anticipated that NTRT will make a brief presentation on objectives and goals of the meeting and the need for a watershed assessment. This will be followed with a short presentation by the assessment team on the current status of the assessment and the findings as presented in the Tech Memo I. At this point the public participation leader will explain the rules of the "Non-judgmental Information Exchange" and lead the attendees into a free flow of ideas and information collection. This will be followed with the comments on the DRAFT Tech Memo I and evaluation of the Environmental Improvement Projects rating matrix.

11.3 OBJECTIVE AND GOALS OF THE INITIAL PUBLIC PARTICIPATION MEETING

The objective of any public participation meeting, especially the initial one, is to include all participants on equal footing in determining the outcome of the process or project. In this case the process is a watershed assessment. The goals are the steps that must be taken to achieve the objective. In this case the goals may include inputs into the type and depth of data collected; inputs into possible location of additional data; collection and inclusion of anecdotal information; relocation of data collection sites; modification to the DRAFT Tech Memo I; changes to the Environmental Improvement Projects ratings matrix; and even changes to the overall objective of the watershed assessment.

For the sake of discussion the preliminary objective of this watershed assessment is as follows. The objective of the Edgewood Creek Watershed Assessment is to analyze the current conditions of the creek and the watershed and to develop a plan that identifies and prioritizes proposed restoration and reclamation projects.

12.0 PRELIMINARY PROPOSED EIP SELECTION MATRIX

The preliminary Environmental Improvement Projects (EIP) ranking matrix is attached. Readers of this document should feel free to suggest addition of items to the matrix for evaluation.

For each suggested or proposed EIP, stakeholder will rate the items under the heading of benefit or cost. The rating is subjective; however, during the public participation meetings knowledgeable persons will be available to assist with details and objective values as necessary. The highest value that can be assigned to a benefit or a cost is a 5. A high value like 5 in the benefits heading implies that the EIP is a significant benefit to the watershed and stream. While a 5 in the cost heading implies the project will be expensive to install or construct. A value of zero on the other hand implies a no benefit or even a detriment to the watershed, but it implies a low cost project. The average value of the cost will be divided by the average value of the benefits to obtain the final value for the project.

During the public participation meeting the meeting leader or others will make a short presentation on how the matrix will be used. The stakeholders will then be asked to input into the selection matrix items that may improve the future selection process. The final selection matrix will be issued after the initial public participation meeting.

As an example of how to rate the EIP via the EIP selection matrix please consider the following:
EIP 882-2005: Improve channel morphology, substrate and vegetation cover for 4 miles of the upper main channel stem of Edgewood Creek.

Benefit: With the completion of this project at least 4 miles of the creek will go from fair to good condition.

Please see the attached project-ranking matrix for an example of values assigned to the above proposed project.

Project Ranking Matrix

significant ben

Score:5=

[illegible]

* MATRIX BENEFITS ARE BEING DEVELOPED USING STANDARDS AND GUIDELINES CURRENTLY UNDER REVIEW BY TAHOE REGIONAL PLANNING AGENCY (TRPA).

Project Ranking Matrix (example)

significant bene

Score:5=

[illegible]

EXPLANATIONS:

Aspen Recruitment: Because Aspen trees are more productive given a higher groundwater table and vegetative bank stabilization has been shown to provide water bank storage, it is expected that Aspens will flourish.

Steam Habitat: Vegetative bank stabilization will reduce the water temperature and provide a more hospitable environment for fish, by improving habitat and conditions that will allow for easier fish passage.

* MATRIX BENEFITS ARE BEING DEVELOPED USING STANDARDS AND GUIDELINES CURRENTLY UNDER REVIEW BY TAHOE REGIONAL PLANNING AGENCY (TRPA).

APPENDIX A: PRELIMINARY STAKEHOLDER LIST

Preliminary Stakeholder List

4 H CAMP MANAGER	
429 KINGSBURY GRADE LLC	
A LAND MANAGEMENT DISTRICT OFFICE	
AALL SEANSONS SPORTS INC	
ALLISON	STEPHAN & ISABELLE
ALLISON	ROBERT & ELIDA
ALPENGLOW SPORTS	
AMODEI	MARK - SENATE DIST
ARAMARK	
BANK OF AMERICA	TRUSTEE
BEHENSKY	PETER & EILEEN
BEINERT	JOHN
BERGE	JORG-LEO & BONNIE
BERGE - ATTN: TOIYABE NATIONAL FOREST	JORG-LEO & BONNIE
BERKLEY	SHELLEY - US CONGRESS
BLEVINS	BEDFORD & REN-NA
BREWER	CHARLES
BREYLINGER	JOHN & JUDY
BUREAU OF LAND MANAGEMENT	DANIEL JACQUET
BUTLER	MARSHA
C2ME ENGINEERING	
CA WATERSHED RESTORATION SPECIALIST	KIMERLY CARR
CALIFORNIA SPORTS ACCESSORIES	
CALIFORNIA TAHOE CONSERVANCY	DENNIS MACHIDA
CAMP GALILEE	
CAMPBELL	STEPHEN
CARSON CITY	
CARSON CITY	UTILITIES
CARSON CITY	PUBLIC WORKS
CARSON TRUCKEE WATER CONSERVANCY DIST	
CARSON WATER SUBCONSERVANCY DIST	GENIE AZAD
CARSON WATER SUBCONSERVANCY DIST	ED JAMES
CARTOZIAN	ROGER - TRUSTEE
CHAKMAKIS	GEORGE JR
CHRISTIENSEN	MARGARET
CITY OF SOUTH LAKE TAHOE	
COLE	WILLIAM
COPE & MC PHETRES MAINE INC	
CRISTANDO	ROBERT & STANA
CULTURAL COORDINATOR WASHOE TRIBE	WILLIAM DANCING FEATHER
CUTTING EDGE SPORTS OF LAKE TAHOE	
DAHL	NANCY
DATAPLACE LLC	
DAVITON	DAVID & JJ & JESS
DESERT RESEARCH INSTITUTE	
DOUGLAS COUNTY	CLEARKE-TREASURER
DOUGLAS COUNTY	SEWER IMPROVEMENT DISTRICT
DOUGLAS COUNTY	KAHLE COMMUNITY PARK & RECREATION
DOUGLAS COUNTY	UTILITY DIVISION
EBERLIN	RAY & KAREN
EDGEWOOD	STEVE SEIBEL
ENSIGN	JOHN - US SENATOR
EWING	DAVID
FALLEN LEAF WATER CO	% BOB FOUCEK
FERGES	TERRY
FISHMAN	BARBARA & LORD
GALLERY OF LEGENDS	
GARRAMONE	MELISS
GIBBONS	JIM - US CONGRESS
GIBSON	WILLIAM
GLENBROOK WATER CO	
GOLDSTEIN	RICHARD
GREAT OUTDOOR CLOTHING CO	
GRIFFITH	DANIEL

Preliminary Stakeholder List

GRUSENDORF	KENT
GUTHRIE	JOHN SR & JUDY
HAEN ENGINEERING	
HALL	DONALD
HALL TRUST	
HARMON	DENNIS & NANCY
HARRAH'S CLUB	
HEAVENLY	ANDREW STRAIN
HEAVENLY VALLEY	
HETTRICK	LYNN - DIST 39
HOGSTEDT	ELAINE
HOUSE OF SKI	
HOWARD	DANIEL & JOYCE
HSU	CHIH
HUGHES	MICHAEL
INCLINE VILLAGE GENERAL IMPROVEMENT DIST	
INCLINE VILLAGE GENERAL IMPROVEMENT DIST	PUBLIC INPUT LINE
INCLINE VILLAGE GENERAL IMPROVEMENT DIST	ENGINEERING, PUBLIC WORKS
INDIAN HILLS IMPROVEMENT DISTRICT	
J & M WINTER SPORTS CENTER	
JBR ENVIRONMENTAL	DAVE WORLEY
JWA	MARK HOEFER/JERE WILLIAMS
KIDS DAY CAMP	
KINGSBURY ALPINE VILLAGE	
KINGSBURY GENERAL IMPROVEMENT DISTRICT	
KINGSBURY GENERAL IMPROVEMENT DISTRICT	FORREST & SUSANNA
KINGSBURY GENERAL IMPROVEMENT DISTRICT	
LAKE TAHOE ADVENTURES	
LAKE TAHOE SNOW MOBILE TOUR	
LAKE TAHOE SNOWMOBILE TOURS	
LAKE TAHOE SPORTING GOODS	
LAKE VILLAGE HOMEOWNERS ASSN	
LAKEVIEW SPORTS SKI AND SNOWBOARD	
LEAGUE TO SAVE LAKE TAHOE	ROCHELLE NASON
LESSER	TODD
LINDSTROM, SUSAN	
LORENZ	ALLEN
LUCE	R B
LUKIN BROTHERS WATER CO	
LUMOS AND ASSOCIATES	
MANCHESTER	CHARLES & CHARLENA
MARCIA	JAMES
MCCALL	GEORGE & CAROLE
MCGLOTHLI	RICHARD & CAROLE
NELSON	JAMES & NICHOLAS
NEVADA	DIVISION OF STATE LANDS
NEVADA	DEPT OF TRANSPORTATION-HYDRAULICS
NEVADA	DEPT OF TRANSPORTATION-ENVIRONMENTAL
NEVADA	BUREAU OF WATER POLLUTION CONTROL
NEVADA	BUREAU OF WATER QUALITY PLANNING
NEVADA	BUREAU CHIEF-DEPT OF CONSERVATION & NATURAL RESOURCES
NEVADA	DIV OF WATER RESOURCES
NEVADA	STATE PUBLIC WORKS
NEVADA	BUREAU OF LAND MANAGEMENT
NEVADA	DIVISION OF STATE LANDS
NEVADA	DIV OF STATE LANDS -TAHOE RESOURCE TEAM
NEVADA	NV TAHOE RESOURCE TEAM-DONOHUE
NEVADA	NV TAHOE RESOURCE TEAM-ESPINOSA
NEVADA	NV TAHOE RESOURCE TEAM-LAWRENCE
NEVADA	STATE FORESTER
NEVADA	DIV OF STATE PARKS
NEVADA RURAL WATER ASSN	.
NEVADA TAHOE CONSERATION DIST	
NORTH TAHOE MOTORSPORTS	

Preliminary Stakeholder List

NV PUBLIC HEALTH FOUNDATION	
PARK CATTLE COMPANY	
PERCIVAL	JOHN & KATHY
PEREZ	AL
PERFORMANCE SLEDS POLARIS	
PINEWILD CONDOMINIUM OWNERS ASSN	
PORTERS SKI & SPORT	
PYRAMID PEAK SKI AND SNOWBOARD RENTALS	
RAINBOW MOUNTAIN SHOWBOARD RENTALS	
RCI	GEORGE MAHE
REID	HARRY - US SENATOR
RENSON ENTERPRISES LTD	
RENTCH	BRUCE
RIVER RUN CONSULTING	
ROMEIS	KENT & GAY
ROUNDHILL GENERAL IMPROVEMENT DISTRICT	
RUTCHLAND	JJ & VERGUN
SCOLARI	DOUGLAS TRUSTEE
SERPA	JOHN
SHORELINE SKI & SPORT	
SHOSHONE	LYNDA MCDOWELL
SIERRA CLUB	TOIYABE CHAPTER
SIERRA PACIFIC POWER CO	WATER RIGHTS
SIERRA PACIFIC POWER CO	WATER CONSERVATION WATER WATCHERS
SIEVERS	JACK
SKY LODGE BUILDING	
SLEEMAN	KEVIN & TINA
SMALLEY	DOUGLAS AND VIRGINIA
SNOWSHOE THOMPSONS	
SOUTH LAKE TAHOE PUD	ROBERT BAER
SOUTH LAKE TAHOE PUD	
SOUTH SHORE TAHOE LLC	ROBERT MECAY
SPORTS SHOP, THE	
SPORTSMAN	
STOLL	PHIL
SUMMIT VILLAGE OWNERS ASSN	
SUNSPORTS	
SWANSON HYDROLOGY & GEOMORPHOLOGY	
TAHOE BAIKAL INSTITUTE	
TAHOE BIKE SHOP	
TAHOE MOUNTAIN GUIDE	
TAHOE PARADISE RESORT IMPROVEMENT DIST	
TAHOE RESEARCH GROUP	
TAHOE RIME TRAIL ASSN	LYNDA MCDOWELL
TAHOE SNOWMOBILE ADVENTURES	
TAHOE SPORTS LIMITED	
TAHOE VILLAGE HOMEOWNERS ASSN	
TAHOE VILLAGE HOMEOWNERS ASSN	
TANZMAN	ARNOLD & LINDA
TGFT PRODUCTIONS	
THULIN	JAMES
TRI-JAN	
TRINITY SNOWBOARDS	
TRPA	
TRPA	LARRY BENOIT
TRPA	RITA WHITNEY RAMOS
U S FOREST SERVICE	LAKE TAHOE BASIN MGMT
UNIVERSITY OF NEVADA	BOARD OF REGENTS
US CORPS OF ENGINEERS	RENO
US CORPS OF ENGINEERS	SACRAMENTO
US FISH AND WILDLIFE SERVICE	RENO FIELD OFFICE
US FOREST SERVICE	PUBLIC AFFAIRS OFFICER
US GOVT	NV FISH & WILDLIFE OFFICE
US PUBLIC HEALTH	INDIAN HELATH SERVICE

Preliminary Stakeholder List

USGS	WATER RESOURCE DIVISION
USGS	
VERTICAL SPORTS	
VILLAGE SKI LOFT	
VILLAGE SPORTS	
WAHOE COUNTY	SEWER IMPROVEMENT DISTRICT
WALKER	LEON R., TRUSTEE
WALKER	STEVE & MARY
WARD WELL WATER CO	
WASHOE TRIBE	A BRIAN WALLACE
WESTERN BOTANICAL SERVICES	
WILDLIFE RESOURCES	
WILLIAMS SPORT RENTAL	
WINES	JONI
WINTER WONDERLAND	
WOODBURN AND WEDGE	GORDON DEPAOLI
WORLD CLASS RESORTS INT INC	
YEN	CHIH FONG
ZEPHYR	
ZEPHYR COVE SNOWMOBILE CENTER	
ZEPHYR WATER UTILITY	

PUBLIC MEETING ANNOUNCEMENT

Edgewood Creek Watershed Assessment Initial Stakeholders and Partnering Meeting

Sponsored by: Nevada Tahoe Resource Team & Edgewood Creek
Integrated Watershed Assessment Team

When: August 27th, 6:00 PM

Where: Kahle Community Center
236 Kingsbury Grade
Stateline, Nevada

What: The Edgewood Creek Watershed is located within Douglas County, Nevada and drains about 6.5 square miles along the California/Nevada border. US-50, SR-207 (Kingsbury Grade) and private and public streets intersect the creek and its tributaries in several locations. The watershed and creek show signs of cumulative environmental stress including excessive sediment generation, blockage of fish passage, channel degradation and channel relocation. The goal of the assessment is to document and analyze the current conditions and propose potential restoration and reclamation projects. This public participation meeting will allow stakeholders and the general public to find out about the project, input into the proposed project selection process and provide information to the sponsoring agency and its consultants that may not be publicly available.

Please consider attending this meeting if you live or own property in the watershed, use or have interest in the watershed or the creek or have information that may be pertinent to the assessment.

A limited number of copies of the preliminary report of the assessment will be available after August 21st. If there is interest, additional copies will be available at public agencies and libraries for review. Please contact Mahmood Azad at WRC Nevada for additional information.

Ph: (775) 332-3737

Email: mazad@wrcnv.com

PUBLIC MEETING ANNOUNCEMENT

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Sponsored by: Nevada Tahoe Resource Team & Edgewood Creek Watershed Integrated Assessment Team

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Please contact Mahmood Azad at WRC Nevada for additional information.

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